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Labor Redundancy in the Transport Sector

Alice Galenson

Efforts to make the transport sector more efficient and financially viable almost always have serious implications for labor. What issues are involved and how should the Bank address them?

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Policy, Planning, and Research

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Transport

The issue of what to do with excess labor is critical to the success of any endeavor to improve the transport sector — whether that be improving railway financial indicators, upgrading port technology, rationalizing urban bus operations, or privatizing road maintenance.

Failure to reduce overstaffing leads to excessive wage bills. This exacerbates budget deficits and the losses of parastatal enterprises, which leads to cuts in investment or in the purchase of materials designed to reduce costs — further limiting labor productivity.

Moreover, because transport employs so many people, labor redundancy in the sector affects not only the agencies or enterprises concerned but the public sector as a whole.

This paper offers no blueprint for action, but categorizes the principal causes of redundancy, reviews the measures used to reduce overstaffing, and discusses the issues that have to be addressed. The report is organized around the following important questions, discussion of which highlights the need for research and for a method of evaluating the success of redundancy schemes.

- Is technical redundancy at the enterprise level equivalent to redundancy in a broader economic sense?

- Is a direct, but perhaps costly, solution — such as layoffs or forced retirement — preferable to attrition as a means of reducing the labor force?

- Is the solution chosen responsive to the causes of the problem?

- Once the immediate problem is resolved, are additional steps needed to prevent a recurrence?

- When falling demand for labor is inevitable, what changes are necessary to facilitate management response?

- If a short- or medium-term solution is not possible, what are the implications for choice of technology and organization of the labor force?

This paper is a product of the Transport Division, Infrastructure and Urban Development Department. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Wendy Wright, room S10-050, extension 33744.

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LABOR REDUNDANCY IN THE TRANSPORT SECTOR: A REVIEW

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The idea for this paper came from Jeffrey Gutman, whose enthusiasm and support lasted through many drafts. Esra Bennathan, Walter Galenson and Louis Pouliquen contributed valuable advice and constructive criticism. Louis Thompson provided many of the data on railways and helped interpret them. I am also grateful to the many other people who shared their experience and offered helpful comments and to Wendy Wright for her patience in processing successive drafts of the paper.

LABOR REDUNDANCY IN THE TRANSPORT SECTOR: A REVIEW

I. Introduction

Overstaffing of public sector transport agencies is widespread, as it is in the public services more generally. The negative impact of redundant labor on the commercial viability of the enterprises concerned, on the public sector budget and on the allocation of resources in the economy can be substantial. Labor history is replete with attempts to redress the situation, often at great expense in terms of political and social unrest, as well as in monetary terms. Despite the prevalence of the problem in developed and developing countries alike, there is not yet a commonly accepted framework for its solution. Measures promoted by the Bank as part of structural adjustment programs or other projects have attacked the problem directly by asking for large cuts in staff, but often have not dealt with the methods to be used or the effects of large layoffs.

This paper is the second in a series dealing with labor redundancy in the transport sector,[1] and will be followed by research aimed at assessing the experiences of selected countries and enterprises and the various options for resolving overstaffing. Its objective is to set out what is known about the problem - its magnitude, roots and consequences - and the solutions that have been tried. It could be of interest to anyone attempting to deal with labor redundancy, for although it does not provide a blueprint for action, it does review the issues that have to be addressed and present ideas and examples that can be examined in greater depth when relevant to a particular case.

The evidence and examples cited in this paper are drawn from a wide variety of sources, and it may serve as a guide to the available information on labor redundancy. It is not comprehensive, however, since the data are scattered, often not comparable among countries, and sometimes not even consistent or complete within countries. For example, while many examples of labor redundancy are cited, there is no estimate of the extent of the problem worldwide, nor is a comparison across regions possible. The relative importance of the various causes and the popularity and success of different solutions are not known; in some cases, where examples from developing countries are not available, developed country cases are cited instead.

1/ A discussion paper has already been issued covering the experience in Western Europe, the U.S., and Japan (Havlicek, 1988). The present paper deals mainly with the developing world. While examples from industrialized countries are used when appropriate, this paper does not attempt to summarize the results of the earlier one.

The next section deals with the difficult question of how to define and measure labor redundancy, discusses its consequences and presents data justifying a special examination of the transport sector. Section III describes the most common causes of labor redundancy in the transport sector and sections IV and V, some of the measures that have been used to reduce it and to minimize the likelihood that it will recur. Section VI reviews World Bank lending related to labor redundancy, and the final section summarizes the paper and draws some conclusions.

II. Definition, Dimensions and Consequences of Labor Redundancy

Labor redundancy means the presence of too many workers. The idea is simple, but it is difficult to find a definition that is both accurate in an economic sense and practical from the user's point of view. The lack of a standard definition of labor redundancy has contributed to the difficulty encountered by governments and by Bank staff in attempting to deal with the issue. The methods adopted are generally technical, based in some cases on a job by job analysis of an enterprise and in others on informed estimates of the numbers of workers needed to produce a given output and on cross country comparisons of productivity measures. However, these methods often fail to address the questions of economic efficiency and the appropriate mix of inputs, since they generally ignore the effect of distorted prices on factor proportions, rely on average productivity measures, and take the technology as given.

Since market prices determine the choice of technique and factor proportions, labor that is excessive in terms of the economy may not appear so to the firm. In this case it may be necessary to change the prices before the enterprise will want to reduce its labor force.

Alternatively, labor that appears excessive to the profit maximizing enterprise (wages greater than the marginal product of labor) may not be so in terms of its true cost to the economy (shadow wage rate). Thus while the enterprise might want to discharge staff to improve its commercial viability, this might not be the optimal solution for the economy. Once again a change in prices (lowering of the wage the enterprise is forced to pay) would encourage the enterprise to behave in a way appropriate for the economy. In the case of public enterprises, the shadow wage is conventionally considered to be the more appropriate one to use, but this may militate against decentralization in the public sector by perpetuating dependence on subsidies; also there may be other circumstances, as during a budgetary crisis, when it is necessary to base employment decisions on market prices.

The failure to state the problem in economic terms makes it difficult not only to determine the precise number of redundant workers, but also to devise appropriate countermeasures and then to gauge success in treating the problem. While a number of options are available for reducing the number of employees in an enterprise, such a step may require other reforms as well, or it may even be unnecessary if the price distortions are corrected. Success should be judged by the economic impact of reducing the labor force and the extent to which the reduction is sustainable, not just by the reduction itself.

For the purpose of the present paper, which is simply to establish orders of magnitude, it must suffice, following a brief discussion of the measurement issue, to accept the judgements made in individual cases. These are sometimes based on the assumption that the existing capital stock and level of service are appropriate, while in others they argue that certain parts of the operation should be closed down, thus rendering all the workers in those areas redundant. Whatever the method, these estimates will be presented for purposes of illustration, to be followed by a brief review of the consequences.

The Macroeconomic Context

Starting at the broadest level, it is interesting to relate employment to value added in the transport sector as a whole. Table 1 presents the transport share of GDP as a proportion of the transport share of paid employment (in numbers of employees) for a large number of countries aggregated by income level. This is in some sense a rough measure of labor productivity in the sense of average product per worker

in the transport sector. While there are many problems with the data,[2] they show that among the lower income countries, labor productivity in transport tends to rise relative to average productivity in the economy from one income group to the next. This could be due to less capital intensity in transport in the lowest income countries (stemming, for example, from different relative factor prices), to differences in the structure of transportation, to relatively high overmanning in countries where labor is cheap, or simply to different relative prices (which may affect the transport share of GDP). Whatever the reason, the results illustrate the dangers of measuring redundancy in poor countries by

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2/ First, the data are actually for transport, storage and communications, since these sectors are lumped together in the sources for both employment and GDP. To the extent that the transport share is relatively constant across countries, this will not matter, but if that is not the case, the results could be inaccurate. A more detailed breakdown is hard to find, but an examination of statistical yearbooks and World Bank reports for a number of countries did yield some results. In eleven developed countries, the share of transport employment in the total for transport, storage and communications clusters around 70%, with a range from 63% to 82%. Egypt falls into the same range, at 74%, but in Kenya the share is 91%. If Kenya is typical of developing countries, the results described in this paragraph would hold even more strongly. Second, the figures exclude construction (of roads, for example) and transport for own account, thereby underestimating transport shares. Third, the years for employment and GDP figures do not always match. This is not a serious problem, since we are dealing with transport sector shares, and these are likely to be stable over short periods of time. Fourth, the employment data relate to paid employment, and thus presumably omit many small farmers, as well as some people in the urban informal sector. (The definition of employment may vary from country to country as well.) It is difficult to know the effect of these omissions, since inclusion of the former would reduce the share of the transport sector, while inclusion of the latter would probably increase it. On the GDP side, the farm subsistence and urban informal sectors are probably also understated, because they are extremely difficult to measure. This results in at least a partial compensation for the employment data; we are essentially comparing employment and GDP in the market sector of the economy.

Table 1: Transport Share of GDP in Relation to Transport Share of Employment, by Country Income Level

GDP per capita	Transport Share of GDP/ Transport Share of Employment	
	Mean	Median
Up to $400	0.93	1.00
$401 - $1,000	1.80	1.38
$1,001 - $2,000	1.56	1.42
$2,001 - $3,000	1.95	1.49

Source: Annex 1, Table 1.1.

using the manning standards of the developed countries without examining each case in greater detail. One can point out to a government that switching from steam to diesel locomotives tends to reduce labor requirements, but that is quite different from using as a model an American railway with similar length and load factors that can get along with x percent fewer workers. Indian Railways employs 1.7 million staff, compared to 300,000 employed by U.S. Class 1 railways, which have much higher traffic.[3] Yet it is risky to infer high levels of redundancy from this comparison; the U.S. railways face very different

3/ Class 1 railways are defined as those with over $88.6 million in annual operating revenues (in 1986).

factor prices and carry only freight, almost all bulk for longer average hauls on mostly main lines.

These very broad comparisons can, however, help set the stage for assessing the performance of any individual country by providing a rough benchmark, particularly within income groups. Before deciding, for example, whether a particular railway has too many employees, it may be useful to know how the entire transport sector is performing relative to countries at comparable levels of development.[4] One can then look at a range of factors, including capital and labor endowments and prices in the country as a whole and details on the types of traffic and employees.

Labor Redundancy at the Enterprise Level

No single measure provides conclusive evidence of labor redundancy in an enterprise, but several in combination can be used to draw some inferences about its presence. Table 2 presents five such indicators for railways.[5] The ratio of wages to working costs can give

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4/ It is interesting to note in Table 1.1 of Annex 1 that labor productivity in India's transport sector, as defined here, is low (0.50) compared to other countries in its income group.

5/ The indicators shown in Table 2 were chosen for illustrative purposes. Other measures could be used as well, and similar indicators can be found for the other transport modes.

a preliminary idea of whether an enterprise has too many employees, since a high ratio may mean inadequate funds for other necessary expenditures, including the materials needed by the workers to perform their jobs. Countries with relatively high ratios in Table 2 include Greece (0.93), West Germany (0.79), Belgium (0.78) and Algeria (0.73); the lowest ratios are found in Pakistan, the U.S., Morocco, Turkey, Kenya and Korea, all between 0.40 and 0.51. These figures can be compared to a related measure, the ratio of wages to total revenues, which adds information on the railways' viability. The two ratios do not always move together (in Turkey, one is low and the other high), but as would be expected they do tend to correspond, and high values for both of them lead to the suspicion that costs are inflated by excess labor. Greece, West Germany, Belgium and Algeria all have wage/revenue ratios that are close to or exceed 1 (Belgium and Greece are at 2.3), while most of those with low wage/working cost ratios also have low wage/revenue ratios. (China, at 0.23, is the lowest.)

The ratio can be misleading from an economic point of view, for a high value could reflect wages that are set above the marginal product of labor (by minimum wage laws, for example) or revenues that are kept artificially low (by government fare fixing.) Some governments choose to maintain unprofitable lines or charge non-commercial rates in order to provide a social service, then reimburse the railway through subsidies which do not appear in the total revenue figure. In Argentina the high level of wages reflects the large number of employees delaying retirement because of inadequate pensions. In other countries, India

Table 2: Some Indicators of Labor Redundancy in Railways, Selected Countries, 1985

Country	Total Wages/ Working Costs	Total Wages/ Total Revenue	Thousand TU/[a] Employees	Employees/ Km Line	Million TU/ Km Line
Algeria	0.73	0.98	255	5	1.3
Argentina	n.a.	1.62	200	3	0.6
Bangladesh [b]	0.61	0.82	116	19	2.2
China [c]	n.a.	0.23	304	59	17.9
Egypt	0.66	1.10	260	12	3.1
India [c]	0.66	0.48	255	26	6.6
Kenya [c]	0.51	0.40	112	8	0.9
Korea [b]	0.51	0.40	932	12	11.2
Morocco	0.48	0.37	482	7	3.4
Pakistan	0.40 [c]	0.32	196	15	2.9
Tunisia	0.67	0.66	228	8	1.8
Turkey	0.48	0.95	238	7	1.7
Belgium	0.78	2.31	284	15	4.3
Greece	0.93	2.30	199	5	1.0
Japan	0.61	0.70	827	12	9.9
Sweden	0.63	0.76	775	3	2.3
United States [d]	0.45	0.38	4,295	1	4.3
West Germany	0.79	1.13	389	10	3.9

a/ TU (traffic unit) = passenger km + ton km.
b/ 1986
c/ 1984
d/ Class 1 Railways, i.e. those with over $88.6 million in annual operating revenues in 1986.

Sources: World Bank Railway Data Base; Association of American Railroads, 1987.

and China for example, non-monetary compensation, such as housing and social services, is substantial and the low level of the wage bill may be misleading. (On the other hand, inclusion of the workers in the subsidiary services may inflate the total wage bill.) Clearly this ratio can only be used as a preliminary indicator, and more information is needed to determine if indeed the enterprise is overstaffed.

Labor productivity is another partial indicator of labor redundancy.[6] In railways, annual labor productivity can be measured by passenger and ton kilometers per employee, often added together into traffic units (TU) per employee.[7] A railway that has both high ratios of wages to operating cost and revenues and low labor productivity probably has excess staff at prevailing prices and wage rates. The Greek railways carry only 199,000 TU per employee, and, combined with high wage ratios, this is a fairly strong indicator of labor redundancy. Japan and Korea, at the other end of the scale, have relatively low wage ratios and high labor productivity. Some of the railways with low labor productivity also have moderate wage ratios; in these cases more information is needed to draw any conclusions about labor redundancy.

6/ Discussions of productivity measures in some transport modes can be found in Button and Pitfield (1985), Levine (1985), and OECD (1980).

7/ Passengers and freight require quite different levels of labor input. When aggregated into traffic units, the two should be weighted according to the optimum labor requirement per unit of the two outputs. Since this was not done in Table 2, these figures are misleading to the extent that the different railways carry passengers and freight in different proportions. An extreme example is that of the U.S. Class 1 Railways which carry only freight; their labor productivity of nearly 4,300,000 TU per employee is not comparable to that for the other railways, which also carry passengers. Amtrak, which carries mainly passengers, has a labor productivity of 332,000 TU.

Comparing the number of employees and total traffic with the size of the system adds information, although in some cases it is still not conclusive. The U.S. figures of one employee and 4.3 million TU per km of line are consistent with the low levels of redundancy implied by the other measures, and the Bangladesh figures of 19 and 2.2 million respectively are also internally consistent. The Argentine railway, on the other hand, has a high wage bill relative to revenue and relatively low traffic per worker, but also employs only 3 workers per km of line. This probably reflects the excessively large network, some of which is scarcely used, rather than efficient labor use, particularly given the very low traffic per km; in this case it is not inconsistent with the presence of excess labor. In another example of possible inconsistency, Indian Railways has 26 employees per km of line and carries only 255,000 TU per employee, both potential signals of excess labor, but wages amount to only 48% of revenue, and the railway carries a respectable 6.6 million TU per km of line. In China, with 59 employees per km of line and productivity a moderate 304,000 TU per employee, wages amount to only 23% of revenue and average traffic per km is a staggering 17.9 million TU. The intensive use of labor in the latter two cases may be the appropriate response to the countries' factor endowments, as evidenced by low wages. (There may also be some degree of overstaffing.) Information on the capital stock, the real cost of capital, capital productivity and the ratio of capital to labor would help clarify the situation.

All of the above measures must be used with caution, particularly in making cross-country comparisons. Averages can hide many variations within a country, and across countries differences in terrain, composition of traffic (freight vs. passenger, type of freight), average length of haul and capital stock all make comparisons difficult. However, the types of indicators discussed here, when used together, are often adequate for a preliminary diagnosis.

Finally, the use of any measure presumes the existence of the basic data. This is not always the case. In some enterprises it is not even clear how many people are on the payroll, much less the total amount of wages they receive. The records may be inaccurate or they may include many "ghosts," who collect wages but never show up for work. A census of the enterprise might be required before any further analysis can take place.

The Transport Sector

Transportation contributes a substantial share of both GDP and employment. Under the U.N. system of national accounts, transport is grouped with storage and communications, but the latter two sectors are relatively small (see footnote 2). Using these data, shown in Table 1.1 of Annex 1, the share of transport in GDP ranges for the most part

between 2 and 11%, with most countries lying in the 4 to 9% range.[8] The transport share of paid employment ranges from 2 to over 12%, with most countries between 3 and 8%. These figures understate the true importance of transport since they exclude the construction of transport facilities and transport undertaken by enterprises or individuals for their own account. A further source of error, particularly in the lower income countries, is the exclusion of the large informal sector. Despite this bias the data show that the transport sector contributes a greater share of employment in the least developed countries, with the share tending to decline as income rises, up to a point.[9] For the most developed countries the importance of transport for employment tends to rise again, though not as high as in the least developed countries; it clusters for the former in the 6 to 8% range and has a much smaller variance. The same is true for the GDP shares. While it is difficult to draw universal lessons from these data, they do indicate that the share of employment in the transport sector is likely to fall as a country's income rises.

8/ A study of transport in the input-output system of five countries finds similar shares: 6.4% in the U.S.; 5.4% in the Philippines; 5.8% in India; 9.6% in Cote d'Ivoire; and 6.3% in Mexico (Bennathan and Johnson, 1987, p. 8).

9/ This conclusion would be strengthened if, as suggested in footnote 2, the share of transport in transport, storage and communications is higher for developing than for developed countries.

Transport is also important in public sector employment, particularly in developing countries. In some - Tunisia, India and El Salvador, for example - it accounts for nearly one-quarter of the total. In a sample of 43 countries, 12 developed and the rest developing, the latter had a mean of 4.8% of central government employment in transport and communications, compared to 2.9% for the former.[10] By region, the share of transport is highest in Asia (8.2% mean), followed by Latin America (5.5%) and Africa (3.1%) (Bennathan, 1986, p. 22 and Heller and Tait, 1984, pp. 26, 52-53).

Table 1.2 of Annex 1 presents more detailed data on transport sector employment for selected countries. The relative importance of the different modes can clearly vary greatly from country to country. Some countries have no railway or ports, while others may have only one or the other. While it is difficult to generalize, in many countries railways are the most important formal employer in the sector, and their contribution to employment in the economy as a whole is also significant. In India, for example, the railways employ one-tenth of all public servants. The railway share of public sector employment in the Sudan is nearly as high, although the absolute numbers are much lower, at 33,000. Railway employment totals 130,000 in Pakistan, over 100,000 in Argentina and Brazil, 82,000 in Egypt, and more than 3 million in China.

10/ Public enterprises are not always included in these data, depending on the definitions used in particular countries.

Road transport is also important for employment, but data are difficult to compile, since the employment may be spread among numerous government departments (particularly for road construction and maintenance, which are not classified as transport), public enterprises, and private companies. In Brazil the federal roads department alone employs 45,000 people, more than half the number in railways. Trucking, buses, taxis, and other means of passenger and freight transport, as well as repair facilities, also employ large numbers of people, although they may not always show up in the data.

Urban transit systems are often important. Rapid transit in Bangkok, for example, employs 24,000 people, compared to the 30,000 employed in railways, while in Senegal urban transport employs more than the 2,800 in the railways. Ports and airlines tend to be smaller employers, although their numbers can be significant. The ports in Ghana employ almost as many people as do the railways, and for the countries' main airline, employment is around 18-19,000 each in Brazil, India and Pakistan, and more than 10,000 in Argentina and Thailand.

Along with its high levels of employment, the transport sector appears to have substantial amounts of labor redundancy. Although the available indicators have serious flaws, overstaffing is often visible in the large numbers of people sitting in hallways or at desks with no work or in the overwhelming ratio of labor to output, as in an African airport with only two daily flights that operates two 8 hour shifts

(Nellis, 1986, p. 30). While it is difficult to get precise figures in most cases, both because of definitional problems and because many enterprises have failed to acknowledge the redundancy, it is possible to arrive at rough estimates, especially in some of the extreme cases.

Table 1.3 of Annex 1 presents estimates of redundant labor in individual enterprises that in some cases reach well over 80% of the work force (Argentine ports and Costa Rican railways). It must be stressed that most of these estimates are based on purely technical assessments of the enterprises in question, often using international standards, and ignore economic aspects of the problem, such as the possibility that the shadow wage rate is well below the actual wage and that from an economic point of view the employment is not excessive. Table 1.3 also shows some of the large staff reductions, as much as three-quarters in Chile's railways and roads, that have taken place already. In absolute terms, these figures represent significant numbers. The laying off of many thousands of workers is an extremely difficult move. Furthermore, as can be seen in Table 1.4 of Annex 1, transport workers are relatively highly paid: in most countries their average earnings are well above those of manufacturing workers. This raises the cost to the former of losing their jobs and the cost to the employer of paying compensation. It is not surprising that many governments choose to ignore the problem, and that only when faced with a budget crisis and the impossibility of meeting their payroll do they begin to look for solutions.

Consequences of Labor Redundancy

The presence of surplus labor affects many aspects of enterprise performance. The immediate impact is on the wage bill. As was seen in Table 2, staffing costs greater than revenues are not uncommon in railways. The implications for the financial viability of the enterprise are obvious. In a public enterprise subsidies engendered by deficits are a drain on the government's budget and ultimately restrict other public expenditures, including investment.

The interaction between staffing and budgets can be seen clearly where staff reductions have taken place. British Railways, for example, maintained an average annual decline in personnel costs of 1.3% per year between 1981 and 1985, despite an average annual increase in the wage of 3.5% per year, by cutting close to one-fifth of its staff. At the same time, output per worker rose at 3.5% per year and revenue per employee at 7.4%. Conrail, despite declining traffic and revenues and an increasing average wage rate, was able to reduce its ratio of operating costs to revenue from 109% in 1980 to 88% in 1985, in part through staff cuts of close to 60%[11] (Havlicek, 1988, pp. 4, 25-27).

An excessive wage bill relative to revenues constrains expenditures on other inputs. There may be inspectors without the

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11/ At the same time, Conrail restructured its operations and investment program.

vehicles or fuel to get to inspection sites, repairmen without the necessary tools or spare parts, maintenance teams without the needed materials. A clear example of such a situation is that of Argentine Railways, where wages exceed total revenue by 62%. Such cases illustrate a degree of labor intensity so inefficient that the size of the labor force could probably be reduced without reducing output (zero marginal labor productivity). Investment may also be constrained, thus limiting the prospects for productivity improvements.

In extreme cases, a reduction in staff might even lead to an increase in output (negative marginal productivity). This could happen, for example, if the large number of staff with little or no work has led to a bureaucratization of operations, with simple tasks expanding into multi-step processes, or where the sheer physical presence of too many workers actually interferes with the work. One such case can be found in the port of Karachi, where the traditional organization of labor is inappropriate for efficient handling of containers, and, unable to dispense with dock laborers, some stevedoring companies actually pay them while using their own labor to work the containers (World Bank, Pakistan, 1987, p. 122).

A large work force may mean not only a high wage bill but also a low and compressed salary structure. In Sri Lanka, for example, the ratio of salaries from the top to the bottom of the government pay structure fell from 9.6:1 in 1975 to 4:1 in 1983, a period during which public employment rose rapidly (Lindauer, 1987, p. 2). In Ghana, the

ratio of basic compensation from the top to the bottom in 1985 was roughly 2:1 in the civil service, compared to around 10:1 in the private sector (World Bank, Ghana, 1985, p. 139). Low and compressed salary structures impair worker morale, make recruitment more difficult, increase absenteeism and encourage the practice of moonlighting, which may be a misnomer since the second job is often held during official working hours. They can also lead to a shortage of higher level staff and an imbalance in the structure of the labor force. All of these factors affect labor productivity and ultimately output.

Although budget deficits and enterprise inefficiency are probably the primary motivating factors for dealing with labor redundancy, there is another important aspect. Transport is in large part an input into productive activities, and to the extent that it is inefficient this increases the costs of those activities, reducing economic growth for the country as a whole. If transport is subsidized, as is often the case, the result may be higher costs, not for the users, but for the economy in terms of misallocation of resources, uneconomic location of activities and reduced efficiency. These costs are rarely quantified and are easily ignored, but they can be substantial. Gelb, Knight and Sabot (1988) have examined the effectiveness of using the public sector to create jobs. Using a computable general equilibrium model they show that as expenditure on unproductive public sector employment and the capital associated with it crowds out productive investment, the dynamic effect on economic growth can be many times the static impact on output, and the attempt to reduce unemployment futile.

III. Causes of Labor Redundancy

Many factors can be at the root of labor redundancy, and it is important to determine which ones are present because it may be pointless to eliminate the excess labor without also taking steps to prevent a recurrence. One group of causes relates to a decline in the demand for labor, while another stems from rigidities which prevent the labor force from adjusting to the change. The two sets of causes frequently interact. This section treats them in turn, with examples drawn from developing countries whenever possible. It does not attempt to quantify the impact of each cause except by way of examples, nor does it examine the effects on skill distribution. Such information, while important, requires further research.

Declining Demand for Labor

In some cases labor redundancy results from economic growth or decline or from structural shifts in the economy which lead to regional or modal shifts, a general decline in the demand for transport or changes in relative factor prices. In the case of railways, growing competition from other modes, particularly road transport, is also important. Technological change has been another frequent source of labor redundancy in all transport modes. Disinvestment, or a failure to

renew the capital stock, may also reduce the need for labor. Finally, privatization, while it may or may not diminish the total need for labor, does require reductions in the public work force, if only through transfers to the private sector.

Macroeconomic and Structural Change

A contracting economy is likely to have a declining need for transport. As an input to the production process, transport will decline along with output, and as incomes fall, so will the demand for passenger transport. If trade shrinks, so will the need for transport. Even a growing economy can experience a decline in the demand for transport, or at least for certain transport modes. Structural shifts, such as a decline in imports and growth in exports resulting from structural adjustment, or the reverse, due to changes in the terms of trade, will undoubtedly shift the regional and modal demand for transport, and this can result in pockets of redundancy if workers cannot be shifted from one location or mode to another.

One of the major causes of falling demand for railway services in many growing economies has been the lack of adaptation to the rapid rise in competition from other modes, particularly roads. Road transport, both freight and passenger, is much more flexible than rail, and has forced the latter to concentrate on high density corridors, while pipelines and waterways have taken over some of the low value bulk

commodities. Failure to adjust to these changes has often resulted in commercially nonviable railway services and excess labor (Havlicek, 1988, p. 8).

Many examples can be found of these shifts in countries at all levels of development. In France the share of rail in freight transport fell from 56% in 1963 to 33% in 1984, while roads and to a lesser extent pipelines expanded (Gil, 1986, p. 2). Pakistan Railways (PR) went from a situation of small surpluses in the early 1970s to one of huge losses (US$88 million, or 26% of operating costs, in 1985/86) as it lost more and more traffic to roads. The shorter distance, branch line traffic went first, as PR was slow to develop competitive services, and rail traffic became concentrated on a limited number of long distance routes. At present only 3300 kms out of a total 8800 are commercially viable. Costa Rica provides another dramatic example. As the country's road system developed and a competitive trucking industry emerged, railway traffic dropped from about 1.7 million tons of cargo in 1975 to about 0.7 million tons a decade later (World Bank, Costa Rica, 1988, p. 6). Nearly all of the approximately 2800 staff are estimated to be redundant, as is most of the railway itself. Similarly, the railway from Khartoum to Port Sudan has experienced a decline in annual freight traffic from 3.5 million to 0.6 million tons over fifteen years, but the labor force of 33,000 has been retained (Economist, 1988, p. 44).

Urban public transport also faces a declining market in the more advanced economies, as growing personal incomes permit the

increasing use of private automobiles and as jobs follow residences to the suburbs.[12] As a result of these trends, the number of urban transit passengers in the United States in 1975 was only one-quarter of its peak in the 1940s (Gomez-Ibanez and Meyer, 1978, p. 147).

Technological Change

Technological change in the transport sector has greatly reduced labor needs. Modern railways and ports bear little resemblance to those of a few decades ago. Containerization, modern ship technology (such as roll on, roll off vessels), and other innovations have reduced the size of an efficient port work force by many orders of magnitude. In railways, the shift from steam to diesel power, other advances permitting longer and faster trains, and innovations in maintenance, signalling and passenger and freight handling have led to dramatic decreases in labor needs. Labor saving changes have also taken place in air and urban transit. Annex 2 describes some of the main technological developments in the various transport modes and their potential impact on staffing.

Technological change may actually create new jobs, but they are usually at quite different skill levels from those eliminated and much smaller in number. The French railway (SNCF), for example, increased

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12/ Downtowns account for fewer than 10% of jobs in the major U.S. urbanized areas today (Gordon, 1988, p. 24).

its employment of technicians by about 1,850 between 1975 and 1982, but at the same time the number of unskilled and semiskilled workers fell by about 19,800 and 9,750 respectively (Gil, 1986, p. 13).

Deterioration of the Capital Stock

While investment in the capital stock can lead to labor redundancy, the reverse can do so as well. If an enterprise is unable to repair or replace its equipment, output will fall, and the same number of employees that might once have operated efficiently may become excess. The problem may stem from a variety of causes, ranging from the macroeconomic situation, where, for example, a shortage of foreign exchange precludes the purchase of replacement equipment or spare parts from abroad, to the management and accounting practices of the enterprise itself, which may fail to provide for depreciation and replacement of equipment. The Ghana Omnibus Service Authority is an extreme example: over the years, the lack of imported spare parts and new buses led to a situation where the staff to operating bus ratio reached 55:1 (in 1988). The management, believing this shortage to be temporary, was reluctant to lay off staff.

Privatization

Privatization of all or parts of a public enterprise or agency renders at least some of the staff redundant as far as the public sector is concerned, and means must be found to remove them from the public

payroll. Moreover, if the new private sector operations are run more efficiently than their public predecessors, fewer or different types of workers may be needed. Examples of this type of redundancy can be found in various maintenance operations for railways and ports; in the shift of numerous ancillary activities from the public to the private account; and, though it is not strictly privatization, in road construction and maintenance, where there is a trend toward the use of private contractors in place of government employees. In Ghana, for example, the switch to contract maintenance allowed the Ghana Highway Authority to reduce its staff of 6,000 by nearly half. The greatest decline was among laborers and operators, most of whom were able to find work with private contractors (Harral, Henriod and Graziano, 1986).

Failure to Adjust

A declining demand for labor may be the immediate cause of redundancy, but it is an inability to adjust the labor force to the change that sustains the problem. This rigidity can stem from a variety of sources. Public ownership and legislation introduce a host of non-economic constraints and objectives and complicate the labor-management bargaining framework. Perhaps the major function of trade unions in developing countries, where unemployment and underemployment are often very high, is to protect the jobs of their members, which can be accomplished through labor intensive work rules.

Public Ownership

Transport is largely a public sector activity in most developing countries, and publicly run companies are often subject to political pressures to hire (and not to fire) staff. A number of factors permit overstaffing to persist. These include a lack of accountability (abetted by the availability of subsidies); an absence of competition; and the preservation of enterprises that would fail if they were not supported by public resources. In Pakistan, for example, the publicly run buses, which suffer huge losses, employ 11 staff per bus, compared to an average of 4 in the private sector for similarly sized buses (World Bank, Pakistan, 1987, p. 41). In Calcutta, the public bus company suffers from inadequate repair and maintenance, a ratio of staff to operational buses of over 20 to 1, and substantial fare evasion, and requires a subsidy of around $1 million each month. Private buses of similar size and with the same fares are able to survive without subsidies as a result of high fleet availability, low staffing ratios, and incentives to drivers to minimize fare evasion. The private buses also provide more reliable and frequent service during peak periods. Other such examples can be found (Armstrong-Wright and Thiriez, 1987, p. 12).

Public enterprises sometimes provide certain goods or services in order to gain political or social objectives. In the transport sector unprofitable routes are often retained to provide cheap access

for certain segments of the population. Pakistan International Airlines (PIA), for example, considers its foremost contribution to the national economy to be the provision of low cost air services to inaccessible and less developed regions of the country. One result was that domestic services lost an estimated Rs. 170 million (U.S. $10.6 million) in 1984/85.[13] Whether or not such services are justified, the workers employed by them may be redundant in the sense that they produce less than their marginal cost. The necessary subsidies are often hidden (exemption from taxes or artificially low fuel prices), so the government may not even be aware of their true cost, and the result may be the diversion of users from more efficient alternatives and an even greater need for subsidies. The urban transit examples cited above are a case in point. It is frequently possible to achieve the desired results by other means as well.[14]

Legislation and the Public Sector Bargaining Framework

Legislation can be an important source of inflexibility in labor markets. In Senegal, for example, the Labor Code of 1961, along with later modifications, strictly regulate labor market operations. For example, the use of fixed term contracts is limited, and layoffs of

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13/ In that year the airline as a whole made its highest ever profit, Rs. 822 million (PIA, pp. 2, 29).

14/ For a fuller discussion of public transport and subsidies, see World Bank, 1986, pp. 20-28.

workers with open-ended (permanent) contracts have to be approved by the Labor Inspector, with appeals possible up to the Supreme Court. Even for fixed-term workers, layoffs can only be justified by serious misconduct on the part of the worker or difficulties brought about by an act of nature (such as a fire); an economy-wide recession is not adequate justification. While providing a large degree of stability for some portions of the labor force, this system has apparently led to falling productivity, little incentive for employers to hire and retain workers and, in some cases, bankruptcy of firms unable to adapt to changing market conditions.

Section 13c of the U.S. Urban Mass Transportation Act of 1964 is another example of restrictions on management, with its stipulation that federal grants (which might be used, for example, to purchase labor-saving equipment) can not be used to worsen employee compensation and working conditions unless generous payments are made. For example, laid-off workers would be entitled to full severance pay for the lesser of four years or the length of their employment with the transit firm, provided the layoffs had been imposed unilaterally by management rather than as the result of negotiations (Gomez-Ibanez and Meyer, 1978, p. 151).

Government involvement in the labor-management relationship and the absence of a commercial market context remove much of the discipline necessary for a bargaining solution to disputes. Expectations that the government will step in with subsidies to cover deficits remove the

pressure on management to contain costs, and management's bargaining position may be further weakened by the knowledge that labor may appeal to public officials who are sympathetic, if only because of labor's voting power. Labor leaders, on the other hand, may be frustrated by the lack of a single authoritative counterpart with whom to negotiate and by the potential for repudiation by one official of an agreement made by another. The fact that public officials may have little experience with labor relations in the transport sector can further complicate negotiations (Gomez-Ibanez and Meyer, 1978, p. 149).

Restrictive Labor Practices

Restrictive practices, or work rules, may emerge from concerns for health or safety, custom, demarcation among different types of workers, or legal restrictions on hiring and firing. Rules that make sense under one set of conditions may be rendered obsolete by another, but laws, custom or strong interest groups may delay their reform. To the extent that these practices contribute to low or even negative marginal labor productivity, they reduce economic efficiency and, ultimately, output (and employment) in the economy.

Fixed manning scales which specify the number of workers required for a particular task are found frequently. The rationale behind the requirements may still be valid in providing workers with essential protection, but in some cases while the manning scales may be

appropriate for the technology for which they were originally designed, they tend to be maintained long after the technology has been changed. A well known example is the fireman in the cab who was needed to run steam engines, but whose function was eliminated by the adoption of diesel power; the elimination of the fireman proved to be a major stumbling block. Similarly, containerization vastly reduced port labor needs, but the adjustment has been very slow and is far from complete; in many ports the number of workers employed per crane far exceeds the number that can actually be accommodated. Regulations limiting the discharge of workers are another example of rules which serve an important purpose, but which may be carried to an extreme. Annex 3 reviews some of the more common restrictive practices in greater detail.

IV. Measures for Reducing Labor Redundancy

The least painful way to reduce labor redundancy is to grow out of it, to increase output so that the labor is no longer surplus. This has occurred most commonly in Asia (ports in Korea and Thailand) but also to some extent in other regions (Egyptian railways doubled their output over the last five years). Failing a macroeconomic environment that would permit such a solution, layoffs may be necessary. Many countries have some protection for their workers, whether by law or custom, that makes it difficult to fire them outright, but there are many ways to soften the impact of layoffs, including assistance in finding another job or starting a new business, retraining, and severance payments. Moreover, there are other, less drastic, means than layoffs to reach the objective of a smaller work force. These include a hiring freeze combined with attrition, the elimination of "ghosts" who are paid but do not work, and reduction of the compulsory age of retirement. Still other solutions would be to reduce overtime, reorganize the labor force, create new employment opportunities, cut salaries, or employ a less capital intensive technology, thereby obviating the need to dismiss workers. All of these actions deal with a problem that already exists; they respond to the declining demand for labor.

This section will begin by describing the importance of the social and economic environment in determining the kinds of solutions that are possible, and will then review the various solutions, offering examples of their use and describing some of the costs and benefits involved.[15] No attempt is made at a quantitative analysis of the costs and benefits of the solutions nor of the links between the solutions and the underlying causes. Further research should provide some of these elements. In the longer run, it is important to alter the conditions that allowed the surplus to develop: factors such as legislation, work rules, and bargaining practices which impede the adjustment of the labor force. These factors will be discussed in section V.

The Social and Economic Environment

The ease with which an enterprise can lay off staff, and the costs of doing so, both to the enterprise and to the workers, depend to some extent on the social and economic environment. The availability of national unemployment insurance and social security benefits should reduce the amount the individual enterprise will have to pay to displaced workers. In some cases, the former may even skew the preference of workers towards being discharged rather than leaving voluntarily. This social safety net exists to a much greater extent in industrialized than in low income countries, as witnessed by the fact

15/ Because most of the methods can be applied regardless of the sector, the examples will not be limited to transport.

that subsidies and transfers (largely social security in the case of industrialized countries) account for 60% of central government spending by the former and only 39% in the latter (and 34% in middle income countries; World Bank, 1988b, p. 109). In some countries workers have no social security coverage, and in others what coverage exists is quickly eroded by inflation in the absence of cost of living adjustments. Workers often cling to government jobs because of the benefits; one study concluded that the public sector in Bolivia would find it easier to reduce its staff if it allowed dismissed public servants to retain their health insurance coverage (Klinov, 1987, p. 6).

Opportunities for other employment are of major importance for workers below retirement age. An individual enterprise is likely to find it much easier to dismiss staff if it is an isolated case than if the staff reduction is economy or government wide. Similarly, it is easier to dismiss workers in a growing economy than in a stagnant one.[16] The levels of GDP growth and unemployment are key indicators of the ease with which workers can find new jobs.[17] In many less developed countries, however, these indicators may not tell the whole story. GDP figures may not capture fully the subsistence and informal sectors, and

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16/ On the other hand, workers may be more willing to make concessions in other areas in exchange for preserving their jobs during economic downswings.

17/ In the U.K., national data for the years 1969 to 1982 show a smooth inverse relationship between the annual rates of unemployment and natural labor turnover in manufacturing (Jones, 1985, p.44)

unemployment figures are notoriously poor. The economy of Ghana, for example, showed considerable employment dynamism even under depressed economic conditions when it successfully absorbed returning emigrants from Nigeria in the mid-1980s. Many of them were able to move back into agriculture, while others went into small industry and services (World Bank, Ghana, 1985, p. 70). In Niger, 2,000 staff released by public enterprises (15% of the total) between 1983 and 1986 were absorbed by the private and public sectors, despite a decline in GDP. Some obtained plots of land in irrigation schemes, while others entered the informal sector (World Bank, Niger, 1987, pp. 17, 28-9). These examples may not be typical, but they underline the importance of understanding local labor markets whenever massive dismissals are being considered. Detailed knowledge of labor market conditions can help determine the form in which assistance or compensation to workers should be given, as well as the appropriate timing for the reduction in force.

The ability of the economy to absorb labor depends in part on the mobility of labor and capital. Labor mobility is particularly important when large numbers of workers are released in a single location, such as a port. Often the enterprise in question is the largest employer in the region, and the willingness of workers to migrate may be critical to their ability to find new jobs. In some developing countries this mobility is seen in the close links that many government workers still have with their villages. Ease of entry into the private informal and small scale enterprise sectors is also crucial.

Most of the labor absorption in industrialized countries in the last decade took place in new enterprises, not by expansion of those already existing, and excessive controls on capital movement and private sector activities could stifle this potentially important source of employment (Klinov, 1987, p. 18a).

Some countries have attempted to create employment in the regions directly affected, for example by establishing industrial estates or free zones to attract new firms. Land from closed ports has been made available for redevelopment, but with limited success. Some employers, in cooperation with unions and government, have sought to create jobs by developing new enterprises themselves. The port of Hamburg retained a high proportion of its work force in occupations related to storage, repacking, distribution, transport and processing. The port of Singapore followed a similar approach, and also created jobs by embarking on new activities such as gardening that are totally unrelated to its function.[18] Container repair facilities are another potential source of employment for displaced port workers (Couper, 1986, pp. 87-88). In the absence of a buoyant private sector, some governments have chosen to create public jobs; public works projects have been used in Bolivia, Ghana and the Philippines for this purpose.

18/ The appropriateness of such activities can be questioned, but is beyond the scope of this paper.

Census and Elimination of "Ghosts" and Vacancies

It is not uncommon in many countries to find people drawing salaries but never appearing for work. The elimination of these "ghost" workers is often the first and easiest step in reducing labor redundancy, although even this can present administrative difficulties. An audit or census of the staff is usually undertaken to determine the actual level of staffing and vacancies, for without this basic information, which is lacking in many cases, it is very difficult to make any decisions about redeploying or firing staff. The numbers involved can be large. Censuses carried out in the C.A.R. and Guinea, for example, identified approximately 7% of all civil servants (1300 and 7000 respectively) as ghost workers (Lindauer, 1987, p. 25).

Elimination of vacant positions is also a relatively easy step, though needs must be considered. A civil service audit in Gambia led to the elimination of 1200 vacant posts, 11% of the total. This step can be particularly effective when taken in conjunction with a reorganization of the workplace and increased job flexibility (see below).

Attrition and Freeze on Hiring

Another relatively easy step in eliminating redundancies is to stop all hiring, with the possible exception of certain essential staff,

and rely on attrition to reduce the labor force. This process can be very effective - it was, in fact, a major force in the large staff reductions in many developed country transport enterprises (Havlicek, 1988, p. 19) - but unless the labor force happens to have a very skewed age structure, it is likely to be slow and will not solve immediate budget problems. Another drawback is the potential loss of needed skills, particularly if no new hiring takes place. The federal railway in Brazil experienced this problem when it used attrition (along with some incentives for early retirement) over a twenty-five year period to cut staff from 160,000 in 1963 to about 62,000 in 1988.[19] Brazil's federal road maintenance staff fell by 60% over a ten year period, also mainly through attrition. Portuguese railways cut its staff from 24,000 to 20,000 over six years, and Thai railways cut its permanent staff from 27,500 in 1982 to 25,400 in 1985. ONATRA, the transport company in Zaire, reduced its staff by 20%, to 18,000, over a five year period, through a combination of attrition and forced retirement (with compensation). Countries with a hiring freeze currently or recently in force include the C.A.R., Costa Rica (for the entire public sector, 1984-1987), Gambia, Indonesia (ports), Nigeria (junior levels), and Zambia.

19/ The most recent figure excludes employment in the now separate urban train company; inclusion of its labor force for purposes of comparison brings the current total to about 80,000.

A variation on the hiring freeze is the limitation of hiring to some proportion of departures. In the C.A.R., for example, where the civil service grew from 3,000 in 1960 to 23,000 in 1979, a rule of one new hire for every three retirees was adopted under a 1983 IMF agreement. The budgetary impact of this measure proved less than expected, since those hired usually had higher salaries than those who left, so the restriction was later changed to a 1:3 ratio in monetary terms (Harris, et. al., 1987, p. 36). Indian Railways has placed a cap of 0.3% per year on the growth rate of its labor force, through which, in conjunction with a projected doubling of traffic by the year 2000, it hopes to eliminate its redundancy problem.

Retirement and Layoffs

Many, but by no means all, countries have mandatory retirement at a specified age. Attempts to reduce the size of the labor force often include both strict enforcement and acceleration of this measure. In Yugoslavia, the retirement age was reduced to 60, after 40 years of service, or 65, after fewer than 40 years (Kovac and Madzar, 1986, p. 75), and Togo, in response to an economic crisis, lowered the retirement age for civil servants from 55 to 50, or 30 years of service. A similar measure has been considered in Senegal, but its effectiveness would be limited by the relatively young age structure of the civil service; in 1982, 60% of civil servants were under 35 (Harris, et. al., 1987, pp. 47, 52). Drawbacks include the potential for losing the most

experienced and valuable staff, the increased cost of pensions for the larger pool of retirees, and increased evasion, as when an attempt to enforce Senegal's existing mandatory retirement age was met with substantial falsification of records (Nunberg, 1988, p. 7).

Voluntary early retirement is possible in many countries. Eligibility is usually determined by age, length of service or a combination of the two. In the Port of Singapore, for example, retirement is compulsory at age 60, but the port authority can agree to early retirement at age 45 or 55, depending on the length of service (Couper, 1986, p. 90). In Sri Lanka, the public bus companies reduced their staff from 65,000 to 50,500 over a six year period through a series of voluntary schemes. The monetary costs of voluntary early retirement could exceed those of reducing the mandatory retirement age, since incentives are often needed to attract volunteers. In Zaire, where retirement is optional and pensions small, transport workers were offered from one to three years' salary as an incentive to retire. The costs in efficiency may also be greater, since the most competent people are the most likely to volunteer (because they can most readily find other jobs). For this reason voluntary retirement may be restricted to certain segments of the labor force, such as older workers, those with poor health records, or those with less needed skills.

Dismissal of workers, with or without compensation, is the most efficient method of staff reduction as far as the enterprise is

concerned, for it can target exactly which workers and how many to discharge, but it is often the most costly in terms of social impact and labor relations. In some countries it is prohibited, whether by law, by social custom, or by political realities. It is easiest in countries with strong governments and/or weak labor movements. Argentine railways cut its staff by 40% (to about 100,000) through this means. In Chile, where railway personnel were cut from 27,000 to 7,000 and the longshoremen were shifted completely to the private sector, the unions were destroyed. Pakistan International Airlines cut 4,000 people out of 23,000 after banning its labor unions. Some form of compensation is usually offered, even in the most extreme cases.

The selection of workers to be laid off can be made in a number of ways. Functional reviews of staffing requirements by ministry or department are one relatively well accepted method, and specific choices of those to go are often made on the basis of age or seniority (last in, first out). In Chile, the railway took family status into account, first dismissing single people, then married ones with the shortest job tenure. The Guinean government is using competency tests to establish a minimum cutoff point for discharging workers. The governments of Ghana, Mali and Zambia all used the liquidation of unprofitable parastatal enterprises to rid themselves of unproductive staff. In Sudan, the airline fired all its staff, then rehired the ones it wished to retain, about 80% of the total. (The scheme failed, however, when the airline succumbed to pressures to rehire the remaining 20%.)

The choice of method for reducing staff can vary greatly even within a particular social, political, economic and legal setting. A survey of two thousand British industrial establishments in 1984 found that of the 824 that had reduced their work forces in the preceding year, 578 had used natural attrition, 311 had redeployed their workers, 289 had used early retirement, 162 voluntary redundancy, 206 compulsory redundancy (of which 102 fired those most recently hired), and 7 outright dismissal.[20] An earlier survey had found, not surprisingly, that large firms with strong unions used voluntary redundancy with financial inducements, while firms with weak unions used compulsory methods (Booth, 1987, pp.404-406).

When large staff cutbacks are planned, governments have sought ways to ease the transition for those workers leaving the public service. In Guinea the government established a special reserve status (disponibilité speciale) for those employees who were to be retrained or released. Staff in this category would continue to receive salaries for twelve months, during which time bonuses would be offered for early departure. Meanwhile, structural reforms were expected to improve private sector opportunities, particularly in the agricultural and small scale enterprise sectors. At the end of a year, those remaining in the reserve category would be pensioned off. In the event, progress has

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20/ The total is greater than 824, since some enterprises used more than one method.

been slow, the government finding it more difficult than expected to remove staff from their posts and, later, to cut off salaries after one year in reserve.

Redundancy Payments

Dismissed workers generally receive severance pay by law or by custom. The determination of the amount depends on many factors, including age and length of service, the general availability of unemployment insurance and social security benefits in the country, and the funds available. It may also be important to determine whether workers have a legitimate claim to public employment or whether it is a recent windfall for them (Lindauer, 1987, p. 27). Linking severance pay to length of service (one or two months' salary for each year worked is typical), usually with a minimum service requirement, is a rough way to take this distinction into account. Workers laid off from the Sri Lankan Ministry of Highways during 1985-86 were given two months' salary for each year of service, subject to a maximum of Rs 20,000 (about $670). Temporary workers would normally have no claim on compensation. The U.K. Employment Protection Act of 1978 requires a two year qualifying period at sixteen hours a week or more or five years at eight or more hours a week (Leighton and Painter, 1987, p. 5 and U.K., 1984).

Another important distinction in determining the size of redundancy payments is whether to give them in a lump sum or in

installments. Workers often prefer the former, even if the nominal amount is less, because it gives them capital for investment, perhaps in a new business, and it prevents erosion by inflation. It can be costlier for the employers for the same reasons. The form of the payment may be decided unilaterally by the employer or it may be negotiated with the workers. In some cases individual workers are allowed to choose. When the Jamaican railways cut their staff in half, most workers chose a lump sum over regular payments, even though the sum of the latter was larger. In Guinea a voluntary departure scheme offers two options. Out of a total of approximately five years' salary workers can take 30% up front and the rest in twenty-four monthly payments, or, if they have a project acceptable to a commercial bank, they can receive the entire amount up front in addition to a government guaranteed and subsidized loan.

Minimum redundancy payments are sometimes fixed by law. In Bolivia, employees of the private sector and public enterprises are entitled to either three months' salary in a lump sum or six months' salary in six equal payments, whichever the worker prefers. In practice, the state enterprises have been much more generous, paying as much as forty months' salary (Klinov, 1987, pp. 17, 64). The Brazilian labor code also provides severance benefits. In the U.K., redundancy payments apparently originated as a market response, since they were offered even before they were legislated (in the Redundancy Payments Act of 1965) and continued to be offered as a supplement to legally fixed payments (often by explicit incorporation in collective agreements; Booth, 1987, p. 407).

Severance benefits sometimes include allowances other than salary. When Pakistan Airlines shed 800 employees, it granted them house rent in addition to ten to fifteen months' basic salary with allowance for inflation (PIA, p. 14). Workers laid off from the state-owned shipping company in Indonesia received only six months' salary, but were allowed to keep their company houses for two years.

On top of the redundancy payment, workers may also be offered a loan, often at subsidized rates, as in Guinea, where the government created a line of credit at concessional rates for the establishment of new businesses by former public servants. Nearly 1400 requests for project financing were submitted within the first two years (World Bank, Guinea, 1988, p. 6). In Chile, dismissed railway workers were given one year's salary and were offered cheap credit to buy trucks. A combination of factors led to such an enthusiastic response that the competition from the new truckers cut sharply into the demand for railway services, threatening their viability. While it is not generally in a country's best interests to extend credit at below market rates, the use of this instrument in the context of large scale redundancies does highlight the importance of ensuring a business climate conducive to entry by new entrepreneurs.[21]

21/ Other ways to create such a climate include the reform of laws governing new investment and removal of barriers in capital markets.

While it might appear costly to pay a worker one or more month's salary for every year of service, the savings in the wage bill from a reduction in the labor force may also be large. In fact, such an expenditure would be recouped through savings in salaries and benefits within a few years even for employees with the longest length of service.[22] The period will be shorter to the extent that total remuneration includes non-wage benefits for which compensation is not offered; in some cases these other perquisites, such as free housing, transportation, health services, bonuses, etc. can amount to more than the basic salary, whereas redundancy payments are usually based solely on the latter. To the extent that the reduction in the work force increases efficiency, the return will be even greater.

These conclusions must be qualified, however. First, the payments are frequently made in a lump sum, and the enterprises with the highest levels of labor redundancy are likely to be those with the largest deficits; many simply do not have the cash to make the payments. Second, in a country with a high rate of inflation, an up front payment becomes much more valuable to the worker, and the length of time needed to recoup it much longer, since future savings in salaries are heavily discounted. Third, if the redundancy payment is coupled to pension rights, the savings may be much less, depending on the relationship of

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22/ An example of the calculation of the period needed to recoup the costs of redundancy payments can be found in Khan (1986).

the pension to the foregone wages. Finally, and most importantly, the savings can be achieved only if pressures to rehire or replace the retrenched workers are firmly resisted.

Several examples illustrate how the cost of a redundancy scheme can vary widely across countries. When 16,000 of the 80,000 employees of Ghana's Cocoa Marketing Board were laid off in 1986, they were given payments averaging eleven years' base salary (which is only half of total compensation). The total cost of the program came to $20 million, or an average of $1250 per employee. Although the existing labor agreement called for such payments to be made in a lump sum, the President intervened to spread the payments over three years. After adjustment for inflation and foregone interest, the actual cost of the payments was 4.5 years' salary per worker (Nunberg, 1988, pp. 9-10). In the case of ports in Chile in 1981, the law provided for $50 million to be paid to 3500 stevedores, and private companies added another $20 million. Payments thus averaged $14,300, but actually ranged from $10,000 to $200,000. Plans underway in Sudan include estimated average payments to railway workers of around $4300[23] (World Bank, Sudan, 1988, p. 31).

A large labor reduction exercise now underway in Ghana calls for a further 15% reduction in the size of the civil service over three years, but many public agencies cannot afford to lay workers off, or even to encourage early retirement, because they do not have the cash

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23/ This is a preliminary estimate; work is now underway to determine more accurately the amount that will be necessary.

for the lump sum payments customarily offered (World Bank, Ghana, 1985, p. 138). The railway unions estimate that five to six hundred workers would be ready to retire if they could be guaranteed pensions, but the railway does not have the funds. Clearly, when payments are offered for voluntary retirement, it is important that the administrative machinery be in place and the money actually on hand. In Guinea, where the cash was not available until five or six months after the program was announced, public confidence in the government's ability to carry out the program was severely eroded. Sudan Railways is preparing to reduce its labor force by 9,000 (26% of the total) over three years. One of the first steps will be to set up a Staff Rationalization Fund, to be supported by bilateral donors, which will finance redundancy payments.

Redundancy payments increase the cost of labor to a firm, as does any other benefit, and their widespread use can result in increased unemployment in the economy as a whole. For this reason some European countries have recently cut back mandated benefits. Spain and the U.K. have both dramatically cut severance pay requirements in order to bolster employment and economic flexibility (Krauss, 1988). By increasing the cost of shedding labor, large redundancy payments can also lead to the phenomenon of labor hoarding, whereby an enterprise that expects a recovery in growth may hold on to its surplus labor to avoid the cost of firing (and later rehiring and retraining) workers. The example of the Ghana Omnibus Service Authority cited above is such a case. Labor hoarding reduces labor mobility, potentially distorting factor markets and reducing efficiency in the economy.

Closure or Privatization

One relatively easy method for selecting which workers to release from the public service is simply to close down or privatize whole enterprises or discrete operations within them. Actual closure of entire enterprises is less common in transport than in such sectors as manufacturing, but it does happen. Aero Mexico closed down temporarily following rising deficits, due in part to an excessive labor force and to a strike. Other examples of enterprise closures include the railway in Sierra Leone and airlines in Mali, Niger (pending), and the C.A.R. A number of railways, in countries such as Brazil, Yugoslavia, and Costa Rica (pending) have shut down unprofitable lines in order to concentrate on the more viable parts of their networks. Uruguay Railways recently closed down its entire passenger and parcel services, as well as some of its cargo services.[24]

Privatization does not necessarily reduce the number of jobs, but it does ease the burden on the public payroll, assuming that the employees really are transferred or eliminated. Moreover, the expectation is that since private sector operations are likely to be more efficient and financially accountable than those in the public sector, the level of excess employment in the enterprise will decline. Full or semi-privatization (the creation of joint public/private

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24/ The 2,000 workers cut so far from the railway (out of 9,000) have been placed elsewhere in the civil service.

enterprises) of entire transport operations, sometimes accompanied by staff reductions, has taken place in the C.A.R. (river transport), Guinea (buses), and Mali (airline), and is being considered in Malaysia (railway) and Argentina (railway freight operations). In the C.A.R. case, when the river transport company was converted into a joint venture between the government and a private company, it immediately discharged 600 of its 1100 staff (with compensation).

Some transport agencies or enterprises carry out activities that may be related to but are totally separate from their main operations. The Sudan Railways Corporation operates a concrete factory, a foundry, a carpentry shop, and an oxygen/acetylene factory, all of which it plans to commercialize. State Railways of Thailand has sold its hotels, Pakistan Airlines shed its non-airline functions, and both the National Office of Transport and the railway in Zaire withdrew from some non-transport activities. The workers carrying out these functions may not be technically redundant, but their explicit separation into commercially oriented entities probably leads to an improvement in the productivity of each activity concerned.

Increasingly common in the transport sector is the contracting out of some operations to the private sector. While this is not the same as full privatization, it can give rise to some of the same benefits, such as increased efficiency. A common example is the maintenance and construction of roads by contract. Countries that have

tried this method can be found in all regions and include the C.A.R., Ghana, Guinea, Kenya, Nigeria, India, Japan, Pakistan, Algeria, Turkey, Yugoslavia, Argentina, Brazil, Chile, and Colombia, as well as the Netherlands, the U.K., and the U.S. When the Sri Lankan Ministry of Highways shifted from use of its own labor to use of contracts in 1985, it released 30,000 workers. There are now about 450 private contractors in the country employing under 7,000 workers; most of those discharged were absorbed elsewhere in the private sector. Other operations that have been contracted out to the private sector include railway maintenance (in Chile and Japan), the operation of selected profitable lines and the cleaning of rolling stock (both in Thailand), and some port services (in Chile, Cote d'Ivoire, Guinea, Malaysia, Saudi Arabia and Zaire).

Retraining and Redeployment

In a large enterprise or sector where labor redundancy occurs only in selected occupations, it may be possible to redeploy workers to other jobs or regions. Although retraining may be needed, it might cost less than severance pay. Workers often resist redeployment, however, and a number of railway trade unions have limited it in their collective bargaining agreements by requiring, for example, that any redeployment be voluntary and that employees redeployed into lower paid jobs retain their previous wage (Gil, 1986, p. 16).[25]

25/ One danger of redeployment is that it may simply create labor redundancy elsewhere in the economy. When Sierra Leone closed its railway, the staff were transferred to the Ministry of Public Works which now has a large surplus.

Some ports (Douala, Singapore, Rotterdam) have facilities for retraining, but many do not. The main reasons for this are the age structure of the redundant workers, many of whom are near retirement and not "worth" retraining; the nature and number of the jobs created by technological change, which often lie in totally different areas (for example, mechanical equipment maintenance as opposed to cargo-handling) and are fewer in number than those eliminated; and a preference for early retirement schemes and severance pay (Couper, 1986, pp. 99, 109).

Retraining may be offered to workers as part of their redundancy package. A Bank Railway Rehabilitation Project in Ghana included a reduction of manpower, to be achieved mainly through retraining and redeployment, both within and outside the railway (World Bank, Ghana, 1981, p. 7).[26] Benin and Sudan also have Bank projects with training and redeployment funds for workers in state enterprises (World Bank, 1988a, p. 11). In the Gambia, where 2,600 workers were made redundant by a public sector rationalization program, the government, with the help of the International Labor Organization, set up an "adjustment clearing house" which provides training and credit for the establishment of new enterprises (Addison and Demery, 1987, p. 43). The ILO is also undertaking retraining and employment schemes in a

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26/ However, a later attempt to retrain and redeploy labor more broadly in the public sector was stalled by high costs (World Bank, Ghana, 1985, p. 144).

number of other countries where adjustment programs have involved public sector retrenchment, including Cote d'Ivoire, Guinea-Bissau, Mali, Niger, the Philippines, and Senegal. In order for training schemes to be successful it is important that they be responsive to the changing needs of the labor market; this is most likely to be the case if the private sector is closely involved and the training occurs outside the formal educational sector (Squire, 1979, pp. 138-40).

A variation on redeployment is the creation of labor pools, with staff that can be shifted around as the need arises. These pools can smooth out variations in demand for labor among different employers and help prevent the build-up of labor that could result in redundancy when the demand shifts. In the port of Hamburg, Germany, a distinct company (the Gesamthafenbetrieb) lends out its employees to its members (all port employers). The labor pool in the port of Rotterdam employs 2,500 people out of a total of 10,000 port employees. Labor pools were created by automobile companies in the U.S. for displaced workers and by local boards of the National Dock Labour Board in Britain (Havlicek, 1988, pp. 53-4, 73). The Sri Lankan Port Authority, with 19,000 employees, operates an international labor pool, lending workers to other ports in the region. The U.S. airlines attempted to set up a pool from which airlines would rehire personnel laid off by other airlines, but the problems of seniority were too complicated and the number of people involved too large, and the scheme failed (Gil, 1988, p. 23).

V. Longer Run Prevention of Labor Redundancy

In the longer term, the best approach to redundancy is prevention. The port of Kelang in Malaysia foresaw the impact of containerization and cut back on hiring years before it was necessary. This solution was not without costs - for a number of years the port employed fewer workers and a higher capital-labor ratio than was economically justified - but it did prevent the probably much higher costs that large reductions in staff would have entailed. Alternatively, an enterprise could abstain from adopting the latest technology, which may have been developed for economies with quite different relative factor prices. Increased flexibility in the work place and in labor markets, legislative reform and changes in the labor-management relationship can also enhance the ability of the labor force to adjust to changing supply and demand conditions.

Increased Flexibility in Labor Markets

Removing restrictions on hiring and firing and eliminating restrictive practices and work rules can make it easier for employers to deal with labor redundancy and help prevent its recurrence. One fairly common measure in recent years has been to terminate policies that

guarantee jobs to certain groups, such as school graduates.[27] The introduction of competitive exams for new recruits, as was done in the C.A.R. and Togo in the early 1980s, can help ease pressures to hire too many workers. In the Congo a structural adjustment program included new personnel practices that distinguished clearly between public enterprises and the civil service and gave increased autonomy to the former in the hiring and firing of personnel (World Bank, Congo, 1987, p. 18). Modifications of rules that fix manning regardless of technology or that otherwise restrict labor mobility are often necessary to reduce staffing as well as to remove rigidities in the labor force.

Unilateral changes in personnel practices may not be possible, particularly when workers are organized, and these changes may become part of collective bargaining agreements. If the government is very strong (or unions weak), unilateral action may still take place; in Pakistan the government abolished all unions or workers' associations connected with its airline, terminating all agreements with them, and made it possible to discharge employees with compensation (PIA, p. 13). In other countries, non-union workers were hired in competing facilities in order to extract concessions from unions; this was done with some variations in the ports of Felixstowe in the U.K. and San Antonio in Chile, where workers agreed to work two shifts with no overtime.

27/ This step may have additional benefits to the economy; in the C.A.R., the elimination of this practice helped reduce the excessive enrollment in subsidized higher educational institutions and led, presumably, to an improved allocation of public expenditures.

Sometimes changes in the organization of the workplace can reduce overstaffing without discharging anyone. For example, the replacement of overtime with multiple shifts can reduce the cost of getting the job done if surplus workers can be used for the extra shifts. The Bank suggested this to the Port Authority of Thailand a few years ago after it incurred overtime payments equal to 38% of base salaries (World Bank, Thailand, 1986, p. 264). A reorganization of ports in Chile led to a change from one shift of 11.5 hours to three shifts totalling 22 hours and dramatic increases in productivity.

Another possibility, often opposed by workers since it is likely to involve some degree of job loss, is to increase job flexibility. The labor pools described above are one example; others are the elimination of gangs in ports and the creation of the multi-task worker. An agreement reached between the port of Singapore and the Singapore Port Workers' Union in 1982 included job flexibility, and in the port of Cochin, India when no ship is available, the labor force is transferred to other work in the port, including restacking and removal of cargo and its transfer from transit sheds to warehouses (Couper, 1986, p. 69). In Chile a law was introduced allowing the establishment of private firms which can load and unload ships without the usual distinction between workers on board and workers on land. The multi-task worker can also be found in some U.S. airlines, where one employee carries out several tasks previously done by two or more (Gil, 1988, p. 37).

Another type of flexibility can be found in some Mexican ports, where labor has been turned into a variable cost through annual agreements with the unions which set the number of tons to be handled and the total payment. The employers pay the unions, which then pay those who work and subsidize those who do not, so that the problem of labor redundancy is shifted from the employer to the union. Another version is the division of the work force into permanent and temporary groups, with guaranteed work and incomes only for the former. In Japan the work force is divided into three segments: permanent employees with a lifetime guarantee of employment, temporary workers, and those hired on sub-contracts. Chilean ports also have three categories: permanent employees who receive a salary whether or not there is a ship in port; special contract workers, who work and are paid according to volume on a daily basis; and independents.

Use of Intermediate Technology

The determination of the appropriate size of the labor force of an enterprise is closely linked to the choice of technology. In many cases there is a range of available technologies employing different proportions of capital and labor. In an economy with free markets and economic agents responsive to market prices, the choice of technology would depend on the country's factor endowment and the relative prices of capital and labor. However, since market interventions are common and factor prices often do not reflect their relative scarcities, the

technology chosen may not be the most appropriate one. If wages are maintained at above market levels, for example by a minimum wage, and the price of capital is suppressed by controls on interest rates, the technology chosen will tend to be more capital intensive than would otherwise be the case. Managers might also decide to install the most modern technology to improve competitiveness in international markets. Whatever the cause, a shift to a more capital intensive process, coupled with restrictive labor practices, often leads to redundant labor.

Many of the automated processes now used in developed countries for loading and unloading vehicles, maintaining vehicles and facilities, and deploying staff and vehicles, can be foregone in favor of more labor intensive methods, and an enterprise, particularly a public one, might deliberately choose a technology that would preserve jobs. For example, ports might use cranes that can handle either general or bulk cargo or containers, and railways might use manual rather than mechanized means for maintaining tracks and cars.

Indian Railways illustrates the impact that modernization and rationalization of workshops could have on the labor force. It has 45 diesel sheds and 33,000 staff caring for about 3300 locomotives, an average of 73 locomotives and 730 staff per shed. In the U.S. an equivalent system would have only three workshops with an average of 1100 locomotives and 550 staff each. While maintaining the larger number of workshops may limit the opportunities for adopting more modern

technology and enhancing labor productivity, it could be a deliberate choice to preserve jobs; it could also be a rational response to relative factor prices.

For operations to be profitable at an intermediate technology, wages and interest rates must be allowed to reflect the relative scarcities of these factors. In many developing countries this would mean a reduction in wages. The government of the C.A.R. froze nominal wages in 1982, resulting in a real decline in the public wage bill of 25% between that year and 1985 (Harris, et. al., 1987, p. 38). Such a step can also have adverse consequences: staff morale may be damaged and a general freeze on salaries and wages does not ensure that relative wages of various skill levels will be appropriate. In another attempt to reduce wages, some U.S. airlines introduced a two-tier wage structure with lower rates for new employees than for more senior ones. This method may be too gradual in a situation of labor redundancy where little new hiring is taking place, and in the U.S. case it led to excessive friction among employees and is being abandoned. Workers may be willing to make concessions on wages in exchange for non-monetary benefits such as job security or employee participation programs (management or ownership), but these programs may have costs as well. If factor prices cannot be equated with their shadow prices through these or other means, the use of economically appropriate factor proportions may entail financial loss and subsidies.

The Role of Labor-Management Relations

In countries with strong labor unions or with a history of active worker participation in decision making, any successful reduction of the work force will probably require an agreement with the workers and unions on how it should be done. An examination of the experience with labor redundancy schemes in the transport sector of some developed countries found that organized labor generally cooperated, if reluctantly, in formulating the adjustment programs in return for the assurance of compensation for the redundant employees (Havlicek, 1988, p. iii). An important step was the realization among the unions that staff reductions were inevitable; open and frank discussions between management and labor should help in this process.

Gaining the cooperation of workers may be easier when they have a direct interest in the profits of their enterprise. Such is the case in Yugoslavia, where workers' incomes depend on the income of their enterprise and losses may be financed directly by the workers, within limits. Yugoslav workers were intimately involved in the decision to close some uneconomic railway lines (Coopers and Lybrand, 1981, pp. 9, 13). In the case of the Mondragon producer cooperatives in Spain, members chose lower pay over loss of jobs during a period (1979-83) when Basque employment in general fell by one-fifth (Bradley and Gelb, 1986, p. 67). Many countries have adopted the principle of employee participation in decision making through legislation (Ozgediz, 1983, p.

62). The strongest worker role is found in Germany where codetermination gives workers representation on boards of directors, and plant workers' councils are responsible for certain personnel decisions and are consulted on decisions in other areas.[28]

CSX Rail Transport in the U.S., which spends nearly half its revenues on wages, recently negotiated with its labor unions for a contract that will eliminate one-quarter of the work force. Among the 400 work rules considered for revision in order for the reduced labor force to handle the same amount of work were those requiring two brakemen on a train, limiting an engineer's work day to 108 miles and prohibiting flexibility among crafts. As an incentive CSX proposed severance payments of $50,000 to $75,000 and offered to split the $475 million that it expects to save from the job cuts with the remaining workers (Washington Post, 1988b). The final agreement incorporated some of these aspects (Washington Post, 1988a). In a similar vein, Pakistan Airlines, after banning its unions and reducing its work force, shared its profits with the remaining workers.

An earlier example can be found in the Pacific Coast ports in the U.S. (Evans, 1969, pp. 213-217). In a 1960 agreement, the International Longshoremen's and Warehousemen's Union agreed "to

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28/ For a discussion of labor relations in the U.S. transport sector, see Curtis and Crum, 1988.

eliminate restrictions in the contract and working rules, as well as unwritten but existing Union ... restrictions and arbitration awards which interfere with the Employers' rights dealing with sling loads, first place of rest, multiple handling, gang sizes, and manning scales, so as to allow the Employers to - (a) operate efficiently; (b) change methods of work; (c) utilize labor-saving devices...."[29] The employers made concessions in return. All cargo handling operations in the ports were to be carried out by longshoremen, with guaranteed employment and pay for a fixed number of hours per week for registered dockers. A Mechanization and Modernization Fund was established, into which the employers paid $5 million a year for five years, to be used in part to induce voluntary retirement among older workers. There were also increases in wages and improvements in fringe benefits. During new negotiations in 1966, the amount to be paid into the fund was increased to $8.6 million a year, wages and pensions were increased, the retirement age reduced, and the lump-sum due to workers on retirement increased. In return, the workers agreed to refrain from work stoppages for another five years and to allow greater flexibility in the use of men. Many similar examples can be found in the ports of industrialized countries.[30]

29/ Memorandum of Agreement on Mechanization and Modernization, Oct. 18, 1960, quoted in Evans, 1969, p. 214.

30/ Evans (1969) cites agreements in New York, the St. Lawrence ports of Canada, the U.K., Norway, Sweden, Italy, New Zealand and Australia.

Contrasting experiences can be found within the same country. India's port industry is one of the largest single employers in the country. The port of Bombay and the Dock Labour Board employ a work force of 40,000, which includes a considerable surplus of workers. Gang sizes have been maintained in the face of mechanization of cargo handling to the point where the marginal productivity of labor is probably negative. The port of Cochin, which has equally strong trade unions, has adjusted more smoothly. The first major port in India to accept container traffic (in 1973), it did so with the proviso that no labor retrenchment would take place as a result and that the appropriate reduction in staff would take place through attrition and limited new hiring. Generous incentives were offered for voluntary retirement. Gang size was reduced and will probably be reduced further. The result of these policies was a decline in the number of port workers from 3100 in 1970 to 1900 in 1984 and a substantial increase in the average earnings of the remaining cargo handlers (Couper, 1986, pp. 76-79).

VI. World Bank Role in Public Sector Employment Policy

Bank projects often have indirect implications for employment, but direct Bank intervention in issues of public sector wage and employment policy is fairly recent. Interest in this area has grown as more and more countries face the need to reduce public expenditures and deficits, with wages often a major element. (In Brazil, for example, the public payroll consumes three-quarters of government revenues.) There is also a growing realization that pay and employment conditions can seriously affect public sector performance. A recent survey of Bank experience points out that lending in connection with the reform of central government pay and employment policies was rare until 1981, but that between that year and 1987, it was an important element in forty-five lending operations in twenty-four countries (Nunberg, 1988, p. 2).

The types of lending instruments and analytic techniques used have varied. Identification of surplus public servants as an issue is frequently based on rough measures such as their proportion to the total population or to the modern sector labor force, or the inadequacy of operating budgets for supplies and maintenance. Bank objectives have not always been consistent, nor have the potential effectiveness or consequences of suggested measures always been taken into account.

Until very recently, issues of redeployment, retraining and pension and severance obligations for dismissed workers were not seriously considered. Nor has Bank research on public pay and employment provided operational guidelines. Areas where further work would be useful have, however, been identified, including a review of employment and pay experience in individual sectors and public enterprises and a review of experience with severance schemes (Nunberg, 1988, pp. 1-2, 19, 24-5).

A number of arguments can be advanced for active Bank involvement in labor reduction programs in the transport sector. As a significant input to many productive activities, as well as an important product in its own right, transportation has a major impact on the economy as a whole, and reductions in cost can have important ramifications. Transport entities are among the largest public enterprises and a good place to initiate reform, both because of the immediate impact on the public budget and because of the model they can provide for public sector bargaining. Within the public sector, transport provides an output which is relatively easy to measure and therefore to analyze in terms of the required inputs.[31]

There is no central compilation of Bank transport projects with employment conditionality. Until recently, the employment targets were

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31/ Measurement of excess labor is not as easy as it might appear, since measures based on purely technical relationships ignore a number of important aspects (see section II). Nonetheless, transportation is relatively easier to handle than many other public activities.

often implicit in operating or efficiency targets or in the technological advances or privatization goals embodied in the projects. However, explicit staffing conditions in individual transport enterprises are appearing with increasing frequency in structural adjustment loans, public enterprise loans, transport sector loans and traditional transport projects. Table 3 lists those countries which have had Bank projects with transport employment components or conditionality by type of project.[32] There have been twenty-nine projects (including some still in preparation) in twenty-three countries. The projects are heavily concentrated in the African and Latin American regions, which is at least in part a reflection of the serious fiscal difficulties prevalent in those two regions.

Structural adjustment loans and credits and railway projects have been the most popular vehicles for employment reforms in the transport sector, accounting for eighteen projects, with other transport projects accounting for another six, and public enterprise projects for five. In the case of structural adjustment and public enterprise loans, the transport enterprise reforms are only part of much broader employment reforms, while in the transport loans, they are obviously much more narrow. This distinction can be important when it comes to assistance and new jobs for the surplus workers. In some cases, the staff reduction targets stem from the closure or privatization of all

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32/ This list may not be complete.

Table 3: World Bank Projects with Explicit Transport Employment Components or Conditionality, by Type of Project

SAL/SAC	Public Enterprise	Transport Sector	Railways	Ports	Roads
Congo	Benin	Nigeria [a]	Ghana	Ghana [b]	Algeria [c]
C.A.R. [c]	Ghana	Zaire	Sudan		Barbados [b]
Gambia	Mali	Uruguay [d]	India [a]		
Ghana	Mauritania		Indonesia		
Guinea	Niger [c]		Algeria		
Mauritius			Yugoslavia		
Jamaica			Brazil		
Panama [c]			Brazil [c]		
Uruguay			Costa Rica [d]		

a/ Manpower study and productivity targets, with likely impact on staffing size.
b/ Conditionality contained in a side letter.
c/ Privatization or closure; no explicit staffing conditions.
d/ In preparation.

parts of an operation, while in others they are simply stated as a proportion of total employment in the enterprise, with no guidance as to where the cuts should come. Only very recently has the Bank become involved in the details of how to reduce staff or what to do with the surplus. The following examples illustrate the variety of ways in which the Bank has participated in labor redundancy programs.

The Railways Emergency Recovery Project in Sudan (World Bank, Sudan, 1988) will include a program of redundancy payments for more than 6,000 railway workers who will be offered early retirement over the next three years.[33] Although the actual funding for the payments will be provided by bilateral donors, the Bank has been active in the development of the program, which will also finance training and credit for equity purchases and new businesses. In Zaire the Bank has gone a step further; the First Transport Rehabilitation Project will place $1.5 million in a compensation fund for staff departing from two transport agencies (World Bank, Zaire, 1988).

Some other examples, while not in the transport sector, illustrate other recent Bank approaches to labor redundancy. In Guinea, two structural adjustment programs included a series of steps to cut the public sector work force in half, including a civil service census,

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33/ An additional reduction of 3,000 workers will be brought about through attrition and redeployment to other government jobs.

firing of ghost workers, enforcement of retirement, competency testing and the establishment of a special "reserve" status for redundant workers (World Bank, Guinea, 1987 and 1988). None of these steps was easy. The results of the census were contested, new ghosts appeared, and the reserve category was extended beyond the one year initially envisaged. Nonetheless, this is a serious attempt by both the government and the Bank to deal pragmatically with a very sensitive issue. Similarly, in Ghana, a series of Bank projects is helping the government reduce its staff by up to 45,000 through a combination of layoffs (with compensation), removal of ghosts and overaged workers, and hiring freezes; the staff of Ghana Railways had previously been reduced by 3,400 (World Bank, Ghana, 1981 and 1987b). The Bank is also supporting the government's Program of Actions to Mitigate the Social Costs of Adjustment by funding public works and other projects that will relieve the transitional unemployment created by the adjustment program (Government of Ghana, 1987; World Bank, Ghana, 1987a). In Bolivia, where over 40,000 workers were laid off from the mines and the public sector, the Bank is supporting an Emergency Social Fund established to provide emergency relief, social assistance and grants for small scale employment and income generating projects as a bridge until the recovery can take hold (World Bank, Bolivia, 1987 and 1988).

VII. Summary and Conclusions

Labor redundancy is clearly a significant problem in the transportation sector of the developing world today. Although precise numbers must await a rigorous definition, the orders of magnitude leave little room for doubt that large staff reductions are needed in many transport agencies or enterprises in many countries. The transport sector accounts for substantial proportions of public expenditures, employment and GDP, and it is an important input into other sectors, so its inefficiencies are translated into costs for the government and the economy as a whole. These costs can be high.

Various indicators of labor costs and productivity and rough estimates of magnitudes can provide a picture of the situation in many countries, but efforts to reduce labor redundancy in specific cases require better measures. In particular, technical and financial measures and rules of thumb fail to take into account questions of economic efficiency, marginal productivity and the appropriate capital-labor ratio. Labor that is redundant from a firm's point of view may be productively employed from that of the economy (taking into account the shadow wage rate), and it is important to address this distinction before recommending massive layoffs in a public enterprise. In the

absence of an economic framework, it is difficult both to determine accurately the number of redundant workers and to measure the success of labor reduction programs by their economic impact instead of just by their effectiveness in reducing staff.

It is important to identify the sources of labor redundancy, since efforts to deal with the symptoms may be fruitless if the causes are not treated as well. In transportation, labor redundancy is often triggered by technological change and by macroeconomic or structural changes that result in declining or shifting demand for transport. The most obvious response to such events would be to reduce employment accordingly, but this may be precluded by political, social or institutional factors. Thus in addition to finding an acceptable way to reduce staff, it is important to make the labor market more responsive to falling demand in the future. The most important areas to address appear to be the use of public sector jobs to relieve unemployment (this is also a primary cause of redundancy in many countries), management of public enterprises, regulations on hiring and firing and restrictive labor practices.

In the short term, particularly if the government is running large deficits, immediate measures may be needed. Many methods have been used to reduce labor redundancy, and no one method is uniquely appropriate for any one situation. The method used the most frequently worldwide, often in combination with other methods, is attrition, or

normal quits and retirement, coupled with restraints on hiring (including a halt to guaranteed employment). This is the easiest method, since it does not threaten existing workers, but it may take years and it is by no means problem free. It might be opposed by labor unions, since it reduces their constituency and ultimately their power, and it could lead to shortages of some skills. Removal of "ghost" workers from the payroll, attempted frequently in recent years, particularly in Africa, is also relatively easy, although it, too, has encountered many impediments. Privatization and, to a lesser extent, closure of enterprises have been undertaken with some frequency around the world, usually to improve efficiency. The former may or may not reduce employment, but it does reduce the size of the public payroll.

Other methods that have been used include a reduction in the number of temporary workers, who usually have fewer legal rights than other workers, and enforcement of compulsory retirement at a given age or length of service. More difficult steps, which are nonetheless on the rise, include voluntary retirement with the offer of incentives and outright dismissal. Even in the latter case, some compensation is usually offered, but the types and amounts vary widely. Redeployment of workers, either within an enterprise or more broadly in the government, may help, and it can be linked to retraining when necessary.

The cost of compensating redundant workers may be high (often up to several years' salary), but it must be compared to the benefits of

slimming down the labor force. The cost of a few years' salary will be recouped in a few years, perhaps making this a wise investment, and the additional gains from improved efficiency, both for the enterprise and for the economy as a whole, may be substantial. Care is needed, however, to ensure that the necessary cash is available; this factor will influence the choice of methods as well as the response of the labor force. It may not be easy to estimate the sums that will be required, particularly in the case of voluntary retirement, and restraint is needed initially to avoid an excessive response to the offer of an attractive package and the loss of essential skills. Research on experience to date should provide some guidance in this area.

Key factors influencing the choice of method, its cost and the speed with which it is carried out include the macroeconomic environment and its impact on the availability of other jobs; the social safety net, particularly access to unemployment or social security benefits; the degree of rapport between the government and the labor movement; and the extent of the exercise, whether limited to one enterprise or government wide. These factors must be evaluated in each case. Even then there will be no single solution, and most cases will require a combination of methods. To aid in the decision, more comparative analysis of the available options is needed. Although each case is different - the cost/benefit structure of redundancy payments based on salaries will depend on the level of salaries and the importance of other benefits in

total compensation, as well as on many factors influencing the point at which the redundant workers will be satisfied - an in-depth analysis of the experience in a few countries would provide information on relative costs, benefits and success rates of the different methods, as well as a methodology that could be applied to other cases. The experience in some industrialized countries has been studied (Havlicek, 1988), and research is planned for developing countries.

In the long run, steps are needed to prevent a recurrence of labor redundancy or when it is unavoidable, as in the case of falling demand, to enable enterprises to deal with it in an efficient and equitable manner. Reform of regulations on hiring and firing of workers (while taking care to retain some safeguards), modification of restrictive practices, reorganization of the workplace (introduction of shift work, for example) and increased job flexibility within an enterprise can reduce rigidities in the labor market. Gradual adjustment in advance of expected technological change or the adoption or retention of intermediate technology can forestall the problem. Finally, efforts to improve labor-management relations and gain the cooperation of labor in seeking new approaches to an inevitable process are an important element in any labor redundancy scheme.

The World Bank is becoming increasingly concerned with the need to reduce public sector employment, and conditionality in this area is appearing more and more frequently in structural adjustment, public

enterprise and transport sector loans. The Bank is also beginning to share with country authorities the difficult job of determining how to carry out the reductions, how much to pay the redundant workers, what to do with them afterwards, and how to set up institutions to deal with the problem. The importance of economic growth and alternative employment opportunities make structural adjustment loans an attractive vehicle for the retrenchment of labor, but their major drawback is their short time frame. Many substantial and lasting staff reductions have taken years to complete, and even more traditional loans may not offer a long enough time span. However, Bank loans of several types can be a good starting point for reform by promoting the removal of legislative restrictions to labor market flexibility, carrying out the initial census and removal of ghost workers, privatizing some operations, and providing some short term assistance (public works projects, lines of credit) to redundant staff. They may also be a good vehicle for setting up compensation funds, although to be successful these institutions must be assured of funds. Bank policy has generally been to leave such funding to governments or other donors, although some view it as an investment with a high payoff. Further research, particularly on the sustainability of the outcome, would help illuminate the issue.

The key to the success of any labor reduction program is strong government commitment. Without this element, all efforts on the part of outsiders are likely to fail. Redundancy schemes, whether simple or elaborate, cannot succeed if the governments yield to the inevitable

pressures to dilute them. Generous compensation schemes can reduce these pressures, but they are also costly, and rarely will everyone be satisfied. The Bank can contribute to the equation by ensuring that the governments recognize all the costs of failing to act and all the benefits, as well as the costs, of alternative actions. This task should become easier as evidence accumulates and governments learn from experience in other countries. Collection and dissemination of this experience should be a continuing aspect of the Bank's policy dialogue with each country.

This paper has presented many of the issues surrounding the identification, causes and treatments of labor redundancy, but such a review only serves to highlight the many questions that remain. Precise measurement of the problem is impossible without a definition that takes into account economic, as well as technical and financial, factors, and without an accurate measure of the problem it is difficult to develop an appropriate response. A number of possible causes of labor redundancy have been reviewed, but in each country or enterprise it is important to establish as precisely as possible the impact of each cause (on the total number of workers, on the supply of different skills, and on the financial and economic viability of the enterprise) in order to design a response that addresses both short and long term concerns, with priorities attached to each step. A methodology is needed to evaluate the success of redundancy programs by looking not only at their effect on the number of workers and the finances of the enterprise, but also at

their economic impact and sustainability. Issues of timing and transition (including the response by workers to various actions) are of utmost concern when designing a redundancy program; ignoring them could put the whole program at risk. Finally, in order to design appropriate labor redundancy programs, policy makers need a clear understanding of the links between the macroeconomic situation and the types of solutions possible. All of these issues merit clarification through further research.

ANNEX 1

Table 1.1: Proportion of Paid Employment and Gross Domestic Product in Transportation,[a] Various Years and Countries, by Level of Gross Domestic Product Per Capita

	(1) Proportion of total paid employees in transportation (%)	(2) Proportion of total GDP originating in transportation (%)	Col. (2) / Col. (1) Share of GDP/ Share of employment (%)
GDP per capita: Up to $400			
Bangladesh (1981)	5.7	8.3	146
Malawi (1985)	6.1	6.1	100
Burma (1985)	3.3	3.8 (1984)	115
Niger (1986)	10.1	4.4	44
Burundi (1986)	5.6	2.3 (1985)	41
India (1985)	12.0	6.0	50
Tanzania (1981)	8.9	4.6	52
Kenya (1986)	4.7	6.3	134
Senegal (1982)	21.3	8.0	38
Sierra Leone (198	10.9	7.2	66
Sri Lanka (1984)	7.6	11.1	146
Pakistan (1983)	4.3	7.9	172
Zambia (1986)	6.8	6.9 (1985)	101
$401 - $1000			
Bolivia (1986)	7.3	8.4	115
Liberia (1979)	4.4	6.1 (1980)	139
Indonesia (1985)	4.8	5.6 (1983)	117
Philippines (1985	5.0	6.8	136
Zimbabwe (1984)	4.8	n.a.	-
Egypt (1983)	5.0	10.3	206
El Salvador (1985	10.5	4.1 (1981)	39
Honduras (1983)	3.0	7.6	253
Cameroon (1981)	5.0	n.a.	-
Thailand (1984)	2.0	9.5	475
Nicaragua (1980)	4.6	n.a.	-
Jamaica (1986)	4.7	8.8	187
Paraguay (1982)	3.3	4.4	133
$1001 - $2000			
Mauritius (1986)	3.8	10.3	277
Turkey (1985)	4.7	10.6	226
Tunisia (1982)	3.8	5.2	137
Guatemala (1986)	3.3	n.a.	-
Costa Rica (1985)	6.2	5.7	92
Colombia (1986)	6.4	9.2 (1985)	144
Chile (1986)	5.9	5.4 (1982)	92
Jordan (1984)	5.4	10.9	202

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	(1)	(2)	(2) / (1)
Syria (1984)	5.7	n.a.	-
Brazil (1985)	3.6	5.1	142
Uruguay (1986)	7.9	7.2	91
Hungary (1986)	8.2	n.a.	-
Portugal (1986)	4.3	n.a.	-
$2001 - $3000			
Panama (1986)	5.6	21.6 (1984)	386
Yugoslavia (1986)	7.8	7.4 (1985)	95
Poland (1986)	7.5	n.a.	-
Argentina (1984)	5.6	5.7	102
Korea (1986)	4.7	9.2	196
$3001 - $4000			
Venezuela (1986)	6.2	13.7	221
Greece (1986)	6.6	7.7	117
$4001 - $6000			
Ireland (1985)	6.3	6.5 (1984)	103
Puerto Rico (1986)	4.4	5.5 (1985)	125
Israel (1986)	4.8	n.a.	-
Spain (1986)	5.8	6.6 (1985)	114
Over $6000			
Hong Kong (1986)	4.4	7.7 (1986)	145
Italy (1986)	5.3	6.2 (1985)	117
New Zealand (1985)	7.8	9.5 (1984)	122
Singapore (1986)	9.9	n.a.	-
United Kingdom (1986)	6.0	6.5	108
Belgium (1986)	7.0	8.8 (1985)	126
Austria (1986)	6.7	6.8 (1985)	107
Netherlands (1985)	6.3	6.9	110
France (1986)	6.5	5.8 (1984)	89
Australia (1986)	7.9	8.1 (1985)	103
Finland (1986)	7.4	7.9 (1985)	107
Germany (1986)	6.0	6.5 (1985)	108
Denmark (1985)	7.0	8.2	117
Japan (1986)	6.0	11.3	188
Sweden (1986)	7.1	6.6 (1985)	93
Canada (1986)	6.7	7.1 (1984)	106
Norway (1986)	8.6	8.8 (1985)	102
Switzerland (1985)	6.2	n.a.	-
United States (1986)	5.7	7.0 (1985)	123

a/ Transportation, storage and communications.

Sources: ILO, 1986; World Bank data.

ANNEX 1

Table 1.2: Importance of Employment in The Transport Sector, Selected Countries ('000s)

Country	Year	Total Public Sector Emp.	Public Enterprise Emp.	Railway Emp.	Ports Emp. (Major Ports)	Airline Emp.	Other Transport Emp.
Ghana	1987	318 [a]	160	8	7	2	6 [b]
Kenya	1980	465 [c]	100 [c]	22	0.2 [d]		
Senegal	1983	70	34	3	1 [d]		3 [e]
Sudan	1988			33	10	3	
China	1986			3200	54 [f]		
India	1987	17000		1700	19 [g]	18 [h]	
Indonesia	1985	2770 [a]	1350 [i]	51	14	14 [j]	31 [k]
Korea	1981	1396 [c]	220 [c]	41	3		
Sri Lanka	1986	1204 [c]	758 [c]	22	19 [d]		51 [b]
Thailand	1983	1370 [a,c]		30	6	10	24 [l]
Egypt	1985	5195		82	5 [d]		30 [m]
Pakistan	1986			131	8	19	17 [b]
Argentina	1981	1590 [c]	1276 [c]	96	17	10 [h]	
	1985			103			
Brazil	1987	1800	1000	106	24	27	45 [n]

a/ Central government only.
b/ Public buses.
c/ Heller and Tait (1984) for the year 1980 or 1981 (1979 for Thailand).
d/ Couper (1986) for the year 1982 or 1983.
e/ Urban buses.
f/ Shanghai (the largest of China's fifteen major ports).
g/ Couper (1986) for Madras and Bombay (1980) and Cochin (1984).
h/ Gil (1988) for the year 1985.
i/ 1982.
j/ Includes 4400 airport employees.
k/ Consisting of bus companies (21,000), shipping (8,000), Indonesia Highway Corp. (toll roads, 1,000) and river, lake and ferry transport (1,000).
l/ Bangkok mass transit.
m/ Cairo Transit Authority. Total public transport employment = 367,000 (plus 103,000 private).
n/ Federal Roads Department (DNER).

Sources: As noted; various World Bank reports; World Bank Railway Data Base.

ANNEX 1

Table 1.3: Some Examples of Labor Redundancy in Transport Enterprises [a]

Country, Mode	Employment ('000's)	Previous Reduction in Work Force ('000's)	Estimated % of Redundant Workers Remaining
C.A.R.			
River transport	1	1/2	-
Cameroon			
Railway	7	-	25
Ghana			
Railway	8	4	27
Roads	6	-	50 [b]
Ports	7	-	70
Mauritius			
Ports	1	5	-
Nigeria			
Railways	36	6	45-50
Sudan			
Railways	33	-	58
Tanzania			
Railways	16	2	50-66
Zaire			
Railways	22	-	50-66
ONATRA [c]	18	4	11
Argentina			
Railways	103	42	50
Ports	17	-	80
Brazil			
Railways (RFFSA)	80	80	-
Railways (FEPASA)	19	11	-
Roads (DNER)	45	68[b]	25
Chile			
Railways	7	20	-
Roads	7	20	-
Ports	1	4	-
Airline	1	4	-
Costa Rica			
Railway	3	-	96 [d]

ANNEX 1

Jamaica			
Railways	1	1/2	-
Mexico			
Roads	50	19	-
Uruguay			
Railways	9	2	50
Ports	6	-	64
Egypt			
Railways	80		33
Pakistan			
Airline	19	4	-
Railways	135	-	40 (60 [d])
Portugal			
Railways	20	4	-
Turkey			
Roads	40	4	10
India			
Railways	1700	-	12-25
Indonesia			
Railways	47	-	36
Ports	6	3	-
Shipping (main co.)	5	2	-
Malaysia			
Railways	10	-	25
Sri Lanka			
Public buses	51	14	18
Ministry of Highways	0	5[e]	-
Thailand			
Railways	27	3	33

a/ Recent years. The estimates have been been made without the benefit of a proper definition of labor redundancy. They are thus highy tentative and are not directly comparable. In some cases they are based on quite detailed analyses of the enterprise in question, in others they are more on the order of guesses. Furthermore, some of them assume the existing technology or state of operations, while others assume some degree of technological or institutional change (privatization or closure of certain operations, for example).

b/ In part through a shift to contract maintenance.

c/ Ports, railways and river transport.

d/ If uneconomic lines were closed.

e/ 30,000 casuals and 5,000 permanent staff have been replaced by 6,750 workers employed by private contractors.

Source: Various World Bank reports and staff estimates.

ANNEX 1

Table 1.4: Average Earnings in Transportation[a] as a Percentage of Average Earnings in Manufacturing, by Level of GDP Per Capita

Up to $400	(%)
Gambia	125.6
Burundi	101.9
Sierra Leone	97.8
Malawi	116.0
Tanzania	124.6
Bangladesh	101.4
Sri Lanka	148.2
Burma	89.3
$401 - $750	
Egypt	107.8
Bolivia	133.2
Honduras	144.3
Zambia	137.7
Kenya	140.8
Ghana	91.6
$751 - $1500	
Costa Rica	115.0
Nicaragua	102.5
Mauritius	191.2
Cameroon	65.6
Zimbabwe	137.7
Philippines	106.5
Nigeria	64.7
Peru	135.8
$1501 - $5000	
Uruguay	98.9
Yugoslavia	113.6
Chile	190.7
Portugal	162.1
Korea	126.9
Jordan	152.3
Turkey	97.1
South Africa	122.0

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Above $5000	(%)
Switzerland	133.2
Sweden	86.6
Norway	94.7
U.S.A.	143.1
Netherlands	91.4
Canada	115.9
Australia	101.6
Japan	114.8
U.K.	105.2
New Zealand	101.6
Italy	94.0
Spain	81.6
Israel	125.9
France	130.0
Other	
Cuba	109.3
Hungary	108.3
Bulgaria	107.0
Czechoslovakia	109.0
East Germany	112.6
Poland	96.6
Rumania	103.9
USSR	104.5

a/ Transportation, storage and communications.

Source: ILO, 1986.

ANNEX 2

Technological Change in Transportation

Ports and Shipping[34]

Revolutionary changes have taken place in cargo handling since the 1960s. Unitization and containerization increased the speed of ship turn around time, reduced inventory costs and damage, and reduced pilferage and insurance costs. The introduction of modern ship technology, including roll on, roll off (ro/ro) and barge carrying vessels (LASH), also speeded the loading and unloading process. Modern vessels and cargo handling have even reduced the need to clean up wharves and quays, since spillages and breakages are reduced.

The impact on labor needs is staggering. Cargo that previously took 18 to 20 man hours to unload can now be unloaded in two and a half minutes by one operator, and a ship can unload and reload in 12 to 24 hours instead of the previously required week. In Mauritius, modernization reduced port labor needs to about 10% of the 6,000 strong labor force. Many countries whose factor endowments would have dictated a continuation of labor-intensive techniques were moved to adopt the new technologies in response to pressure from shipping lines, trading partners, and competition from neighboring ports.

34/ Based on Couper, 1986, pp. 7-48, and Donn, 1988, pp. 35-38.

ANNEX 2

World container traffic grew from 47 million tons in 1970 to 280 million tons in 1981, an average annual growth rate of 18.5%, and the growth was much faster in some developing country ports.[35] Many factors, such as world economic conditions and the substitution of other transport modes (air, pipelines, road and rail), have contributed to the loss of port jobs, but it is informative to compare changes in employment with the increases in container traffic. Such a comparison for 18 developed country ports from the 1970s to the 1980s shows a generally large inverse relationship, with an average fall in employment of 30%, including a loss of 12,800 jobs in one U.K. port and over 9,000 in the port of New York.[36] Twenty-six developing country ports lost an average of 16% of their workers, but the relationship between employment and expansion of containerized cargo is less clear than in the developed countries. Continued handling of cargo to and from containers within

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35/ In Bombay, the growth of containerized cargo averaged close to 50% per year between 1974 and 1984, in Jeddah it was over 30%, and in Lagos, Manila and Singapore it averaged more than 20%. (Temple, Barker and Sloane, 1988.)

36/ A relatively extreme case is that of all U.K. ports during the period 1965 to 1984. Despite a 75% increase in traffic (excluding fuels and bulks), employment fell from 129,900 to 38,900, while labor productivity (tons per man year) increased nearly six-fold. These dramatic changes can be attributed to the adoption of containerization and ro/ro methods, along with privatization and increased competition that led to the gradual elimination of many of the restrictive practices found at the beginning of the period (Harding, 1988).

the port, legislation, pressure from unions, and combinations of these factors have sometimes prevented adjustment. However, large job losses are probably inevitable.

Break bulk general cargo vessels still carry over one-fifth of world shipping (by tonnage), and here, too, a number of labor saving innovations have been introduced over the years, including fork lift trucks, mobile cranes, conveyor equipment, increased palletization and packaging of cargoes, and pre-slung handling techniques. The introduction of fork lift trucks and other mechanical aids reduced gang size in a typical port from 14 to 8 per hatch, while the palletization of cargo cut the number of workers needed per ship to almost one-third of its previous level. Bulk cargoes, such as ore, coal, coke, bauxite and sand, which used to be handled with buckets, scoops and baskets, are now handled mainly by large grabs from shore cranes that can lift about 40 tons of ore at a time, as well as by bucket chain, conveyor and screw spirals for ores and coal and pneumatic devices for grain. Liquid bulk, which makes up over 40% of seaborne cargo, is handled almost entirely by automated systems. Palm oil, which used to be carried in drums and required approximately 800 man hours per thousand tons to load, can now be loaded by one man in ten hours. The loading and unloading of a large bulk carrier in a modern bulk terminal may require 6 to 8 workers per ship, compared to 50 to 100 for a conventional general cargo ship. At one port in India, the mechanization of coal exports displaced an estimated 6,000 workers, while new iron ore berths at two other ports reduced labor needs by 3,000 and 5,000.

ANNEX 2

More recently, computers have been applied increasingly to cargo handling, starting with functions such as payroll and accounting and continuing in the 1980s with on-line work such as container control, cargo clearance and information retrieval systems. Computers have also contributed to the automation of bulk and container handling systems, with obvious implications for manpower needs.

Increases in the size of vessels, quicker turn around times, and automation of on-board activities have all contributed to a sharp decline in the need for ship-board employment. From 1947 to 1968, average ship size doubled, and the trend has continued; in the last two decades, tanker sizes have increased four to five times, with further increases expected. The shift toward diesel engines precipitated by rising fuel prices in the 1970s has greatly enhanced the possibilities for automation of engine rooms. Standard crew sizes have dropped from forty to around twenty or less. Swedish operators are experimenting with crews of eight, and Japan is trying a system in which a small group of unmanned ships is directed electronically by a single command ship.

Railways[37]

Railways are often the oldest, as well as the largest, enterprise in a country. Built early in this century, if not before, by colonial powers, many of them have a long history and culture of their

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37/ Much of the information in this section is from European Conference of Ministers of Transport, 1975, pp. 44-89.

own, which may make adaptation to change even more difficult than in other modes. Railway operations and maintenance have changed dramatically in the last few decades. New technology has made it possible to reduce freight train crews in the U.S. from five or six to two or three, while increasing the average load from 1,774 tons in 1972 to 2,574 tons in 1985 (Association of American Railroads, 1987, p. 37). While changes of this magnitude may not be achievable (or desirable) in developing countries, considerable savings are possible. The shift from steam to diesel power eliminated the need for a second man (fireman) in the cab,[38] and the development of continuous, air pressure brakes and automatic signalling further reduced the required crew size. Most recently, the introduction of the rear end marker device on freight trains, mainly in the United States, has eliminated the need for a caboose ("brake van"). Longer trains and faster speeds, resulting from the use of stronger engines, power brakes, higher capacity wagons and the introduction of better coupling devices, have also reduced the number of crew needed to carry a given amount of traffic. The use of computers for scheduling drivers and locomotives has decreased non-productive time and reduced the number of drivers needed for a given size of operations.

Maintenance of rolling stock and tracks employs the largest proportion of railway staff, roughly 40%, and here, too, many labor-

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38/ The Report of the Railway Reforms Committee (Government of India, 1983, p.11) estimated, for example, that phasing out steam would reduce manpower requirements by 108,500, or over 6% of total staff.

saving innovations have occurred. The substitution of electrical for diesel engines, while it has little impact on the size of the train crew, can reduce the number of locomotive maintenance workers by close to two-thirds.[39] In addition, as indicated above, the faster speeds and longer trains made possible by more powerful engines have reduced the number of engines needed for a given output. Rolling stock maintenance has in many cases been rationalized and centralized, and computer based technology is being developed to carry it out. The work force required for the laying and maintenance of the track and road bed has also dropped with the introduction of continuously welded rail, the replacement of wooden sleepers by metal or concrete ones, and the replacement of traditional pick and shovel methods with mechanical ones.[40] In India it was estimated that the mechanization of track maintenance for half of the system would render at least 25,000 workers surplus (Government of India, 1983, p. 11).

Electronic signalling can greatly reduce the staff needed for this function, which employs under 10% of railway staff. For example, in the U.K. by the mid-1970s, color light signalling required only one box for every 100 miles of route, with a staff of 20 signalmen per box, compared to one box for every 2 3/4 miles and 3 men per box, or 109 men

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39/ Electrification also increases maintenance needs to some extent, by adding an overhead line, but this does not cancel out the considerable savings in total maintenance.

40/ For example, a reballasting machine, which is manned by two people, replaces 50 manual workers (Gil, 1986, p. 4).

per 100 miles, under the older system. Today centralized traffic control can reduce signalling staff by a further 50%.

Handling of both freight and passengers has also become more efficient. The introduction of unit trains and mechanized bulk loading and unloading have reduced the number of workers needed for moving freight, while mechanized fare collection and ticket checking can reduce the required number of guards and station staff. The Indian Railways Reform Committee (p. 11) estimated that the increased bulk movement and attendant reduction of marshalling requirements in one yard alone would eliminate 1400 jobs.

Airlines

Recent advances in air travel have reduced the costs of fuel, maintenance and crew, with the greatest savings from the reduction in cockpit crews. Improved radios eliminated the need for a radio operator in the 1950s, and navigational improvements have done the same for the flight navigator. Most recently, the advent of reliable wide-body twin-engined jets and the development of computer and video display technology have made possible the two man Forward Facing Crew Cockpit and the elimination of the flight engineer from medium range operations. Evidence of this development can be seen in the 15% decline in the number of flight engineers among members of IATA in 1981 and 1982. On the ground, the use of computers and independent travel agents for

ticketing have enabled airlines to expand sales while decreasing ticketing and sales staff (Gil, 1986, pp. 6, 10, 13).

Urban Transit[41]

Bus transit systems comprise a wide range of vehicles and methods of operation. Buses may carry from 12 to 240 passengers, fares may be uniform or based on distance or zone, they may be collected by conductors or drivers, and routes and stops may be fixed or flexible. The range of vehicles and services is further extended by informal paratransit systems with small vehicles offering anything from door-to-door service to regular service along fairly well-defined routes. Paratransit vehicles in developing countries include pedal or motor rickshaws, converted vans and pickups, shared taxis and minibuses. They can carry from 4 to 20 passengers at a time.

Except for the possibility of eliminating the conductor, and perhaps for carrying out some maintenance and cleaning operations, technological change does not appear to be a major factor contributing to overmanning in bus transit. While surplus labor and inefficiency are frequently found, they are probably due more to the type of ownership

41/ For a description of different urban transit systems and their comparative performance see Armstrong-Wright, 1986 and Armstrong-Wright and Thiriez, 1987.

than to the technology employed. Public bus services are generally much more costly and less likely to be viable than private ones, and one of the primary reasons for this is overstaffing (Armstrong-Wright and Thiriez, 1987, pp. 6-14). There is little evidence of economies of scale; in fact, small undertakings, particularly those operated by owner-drivers, are much more cost effective than large ones.

Employment in rapid rail transit is important in only a few developing countries, but it does provide examples of jobs lost to new technology. One-person operation of rapid transit trains is not at all uncommon, and a few systems are now entirely automated, with no drivers at all.[42] In the U.S. approximately 9 to 14% of heavy-rail rapid transit employees are conductors; this represents the greatest possible reduction in staff that would be made possible through conversion to one-person operation (Hoess and Murphy, 1986, p. 30).

42/ The unmanned metro in Lille has staffing costs that amount to only 38% of its operating costs, compared to 50 to 75% in some typical manned systems in the U.K. and Canada (Gil, 1986, p. 11). This does not necessarily mean lower cost operations; it merely shows the difference in the labor input.

ANNEX 3

Restrictive Labor Practices

Manning

Rules requiring a fixed number of workers for a particular job are usually related to a particular technology, for which they may be quite reasonable. However, when new technologies are adopted, custom, or more commonly strong unions, sometimes maintain the old ratios even when they no longer have any reason. Examples can be found in all transport modes.

In ports the size of the gangs that load and unload cargo, while originally based on the number of men needed to carry individual crates or bags, can be excessive when applied to modern port technology. While general cargo gangs range from around 15 to 35 workers, the standard gang size under a container system normally ranges from 6 to 10. Rather than agreeing to smaller gangs, workers are frequently able to extract a rent, as is the case when the number of workers being paid far exceeds the number actually doing the job. The workers may reach an agreement whereby those not actually working in the port (many of whom may have other jobs) share their port income with those who are. Another method of distributing rents was found in the ports in Chile

before the labor laws were reformed. Stevedore and dockworker unions fixed the number of workers on each crew, and most stevedores held a monopoly on their jobs. When the system was monitored in 1981 some 3200 stevedores each "worked" 400-600 days per year, earning more than $2000 per month. These earnings were shared with 800 subcontracted workers, who in turn paid some of their income to 12,000 lower level subcontractors. In late 1981 a new law established norms for port workers, abolished the protected port workers register and instituted three shifts instead of two. As a result, labor costs were reduced by about half and productivity rose (World Bank, Chile, 1986, Annex 1, p. 2).

Excessive gang size can even create a workplace so crowded that the marginal product of labor is negative. The port of Bombay may be just such a case. Even after container cranes were installed, management had to continue to employ 22 workers per container crane on the quayside, where only 1 or 2 were needed, and 6 on the ship, where 1 could do the job. Productivity in the port is below the average even for break bulk cargo (about 17 tons per gang-hour, compared to a normal 25 tons), possibly because there is simply too little space to accommodate the large number of workers (Couper, 1986, pp. 76-7). Changes in gang strength do eventually take place, but often very gradually. A comparison of 32 ports or groups of ports in both developed and developing countries found, for example, that between the 1970s and the 1980s, average gang size declined from 16 to 13 men (Couper, 1986, pp. 62-3, 69).

ANNEX 3

Another well-known example of obsolete manning ratios is in railways, where the shift from steam to diesel power eliminated the need for the second man, or fireman, in the cab, but where it has proved extremely difficult to reduce the work force accordingly. Similarly for the guard, with the replacement of the caboose by the rear-end marker device, and for the third man in the cockpit of some airplanes with the introduction of modern navigational and video display technology. Collective bargaining agreements often provide for these positions to be maintained.

The definition of a day's work is often tied to long-outdated technology or practices. For example, in the U.S. a freight driver's workday is still defined as the time required to travel 100 miles, and in the U.K. drivers still receive bonuses for driving more than 125 miles per day (based on a 1919 agreement), even though many services routinely cover more than 350 miles per day (European Conference of Ministers of Transport, 1975, p. 49).

Staffing practices can also lead to large differences among countries in staffing ratios for similar technology. The bus system in Barbados, for example, requires both a driver and conductor on each bus, which, along with other rules, results in an average of 7.7 employees per bus, compared to only 1.8 in Bermuda (World Bank, Barbados, 1984, p. 7).

ANNEX 3

Geographical and Organizational Constraints

One way of protecting the jobs of existing workers is to require that any work done within certain boundaries be carried out by union members. Door-to-door transport and inland container depots eliminate much of the loading or unloading that previously took place in ports. Faced with this situation, the International Longshoremen's Association successfully bargained for a 50-mile rule at several U.S. ports whereby any cargo handling within this radius of the port is to be done by longshoremen or a royalty must be paid. In the U.K., an attempt to impose a 5-mile rule failed (Couper, 1986, p. 43). Contrary to their purpose, such rules may actually reduce potential sources of employment. In the U.K., there is considerable acreage no longer required for traditional port work, but still covered by the Dock Labor Scheme which requires that anything definable as dock work (and the definition is not always clear) must use registered dock workers. It has been estimated that close to 50,000 jobs could be created over a five year period by removing such restrictions (WEFA Group, 1988, pp. 1, 3, 11).[43]

Centralized maintenance of railway rolling stock can increase efficiency (availability of locomotives), and can also reduce manpower

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43/ While some of these jobs would result from increased efficiency, many of them might simply be jobs that would have been created elsewhere. Even the latter can be important, however, in cases where workers are unwilling to relocate.

needs significantly. Traditional, less efficient methods have been retained in countries like India to preserve jobs by dividing the work among numerous (inefficient) shops. As a result, an overhaul of locomotives that could be done in 4 days takes 10 days or more, and the process is carried out every year, although it could be reduced to every third year (World Bank, India, 1987, p. 18).

Hiring and Firing Practices

Governments frequently regulate hiring and firing procedures in order to protect workers. These regulations are often justified, particularly when workers are not well organized to protect themselves, but they are sometimes extended to the point where their negative impact on employers outweighs their positive impact on workers. For example, some countries guarantee employment to everyone in the labor force. The result of such a policy can be seen in Egypt where, in the early 1980s, overstaffing was estimated at nearly 42% of total civil service employment (World Bank, 1983, p. 103). The level of labor redundancy in railways is currently estimated at about one-third, and the public buses had at one time 22 employees per bus.

Hiring requirements in many countries take the form of mandated hiring of certain groups, usually those completing a particular level of schooling. In Senegal, for example, the government, as the employer of last resort, will automatically hire all graduates of universities and

secondary and professional schools, and in Yugoslavia the railways must recruit one new graduate for every 50 existing employees. These guarantees not only strain the public sector budget directly, but they also increase costs indirectly by increasing the incentive for obtaining higher level education, which is frequently subsidized. A number of countries - the Central African Republic (C.A.R.), Mali, Senegal and Togo among others - phased out the promise of jobs in the face of mounting public sector deficits.

Firing restrictions can be even more onerous. In Ghana, the dismissal of five or more workers from public enterprises must be authorized by the Ministry of Labor, except when criminal offenses can be proven (Ayub and Hegstad, 1987, p. 28). In the Sudan, where termination of employment used to require a Presidential decree, procedures were eased in 1983 to permit the firing of workers who failed to show up for three consecutive weeks with no explanation. Senegal has strict rules on firing, as well as on the hiring of temporary workers (whose use could alleviate the impact of the firing laws), and Indonesia Railways still has paid staff on lines that were closed more than ten years ago.

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